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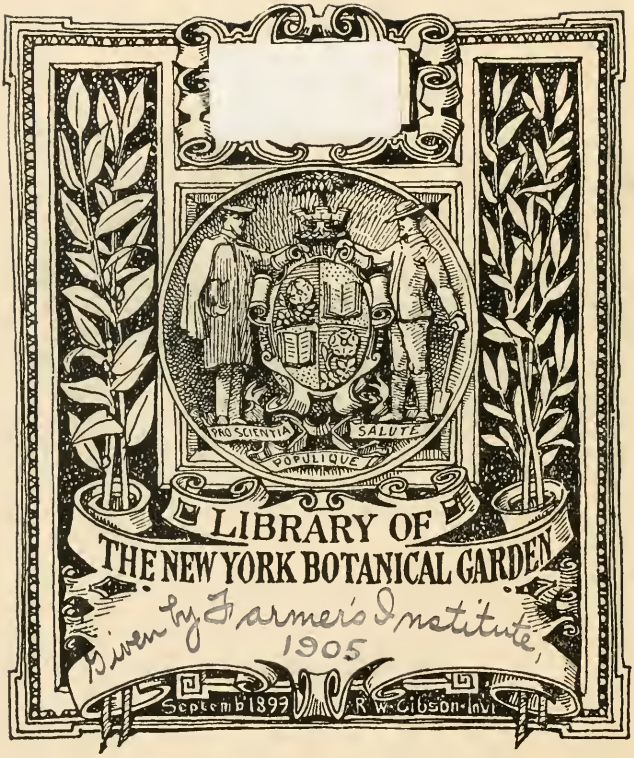
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MICHIGAN

STATE

FARMERS' INSTITUTES

WINTER OF 1903-1904

NEW YORK BOTANICAL GARDEN

PUBLISHED BY AUTHORITY OF THE

STATE BOARD OF AGRICULTURE

AGRICULTURAL COLLEGE, MICHIGAN
1904

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LETTER OF TRANSMITTAL.

To the State Board of Agriculture:

Gentlemen—I have the honor to transmit herewith a report of the institute work carried on under your direction, during the year beginning July 1, 1903. This report includes:

The annual report of the superintendent.

A condensed report of the joint meeting of the annual Round-up Institute at the Agricultural College.

Table showing the attendance at the county two-day, and the one-day institutes.

I respectfully recommend that this report be printed.

Respectfully submitted,

L. R. TAFT,

Superintendent Farmers' Institutes.

Agricultural College, Michigan,

June 30, 1904.

REPORT OF SUPERINTENDENT.

President J. L. Snyder:

Sir—With this I respectfully submit the report of the Farmers' Institutes held in Michigan during the year ending June 30, 1904.

All of the counties reported last year as having institute societies have held two-day institutes. These were opened in the upper peninsula during the month of November, and all had been held previous to the Round-up Institute except the one for Ingham county, which was postponed until the first week in March. The list of counties in which the organizations have been maintained include all in the lower peninsula except Missaukee and Roscommon, and in the upper peninsula there are county organizations in Chippewa, Schoolcraft, Baraga, Houghton, Ontonagon, Iron and Menominee, making up a total of 73 counties in which two-day institutes were held.

The attendance at a large number of these meetings was reduced by the inclement weather. This was especially the case during November, the latter part of January and the second and third weeks in February, during which time fully one-half of the institutes were being held. During the winter months the roads were badly blocked and upon a number of occasions it was impossible for the speakers to reach their destination in time for the forenoon session, but in no case was it necessary to abandon the two-day meetings, although in a number of cases where the speakers were on the program for a single address they were not able to meet their appointments. This has resulted in a slight decrease in the attendance at the two-day institutes, although the number of cases in which the attendance is less than last year is about the same as the number in which the attendance for this year exceeds that for 1902-1903.

During the season 219 one-day institutes were held. In addition to this number some twenty others had been planned for and the speakers assigned but for various reasons, such as a quarantine for smallpox, inability to procure a hall, etc., the meetings were given up. The attendance at the one-day institutes exceeds that of last year by some 3,000, which is accounted for in part by the fact that nine more meetings were held. While the one-day institutes are not doing the work that they should, there is a strong demand that they be continued and that the number be considerably increased. In a large number of counties applications for additional meetings had to be refused and, as the applications for one-day institutes next year is considerably larger than that of one year ago, it is evident that it will be possible

to hold only a small proportion of the institutes for which application has been made. In a considerable number of cases resolutions were adopted urging the increased attention to the one-day meetings and similar resolutions were reported and unanimously adopted by the State Grange and the State Round-up Institute, although in no case was any such action encouraged by the institute management.

The persons employed as state institute lecturers during the past year have, with one exception, been residents of Michigan, and have, for the most part, been engaged in the work for a number of years. Most of these persons are successful, practical farmers or fruit growers and, with few exceptions, have any criticisms upon the work of the state speakers been received, and to show that the criticisms are not always called for, even in these few cases, it may be stated in almost every instance, the speakers who were criticised were given high praise in the next county they visited. The selection of the places for holding institutes, the dates on which they were to be held, the topics to be presented by state speakers and the choice of the speakers themselves, was so far as possible, left with the officers of the county institute societies.

As a rule, two men and one woman speaker were sent to each two-day institute but, in a number of cases, special talks upon "Good Roads," "Farm Law," "Veterinary Science" and Educational topics were arranged for. For the most part, two speakers appeared upon the program in the forenoon and three in the afternoon and evening of each day. In many of the counties the topics embraced "Tillage," "Rotation of Crops," "Potato Culture," "Sugar Beets," "Clover," "Corn," "Beans," "Alfalfa, Grain and other Crops," "Dairying," "Feeding of Cattle, Sheep and Swine," "Silo," "Farm Machinery," "Poultry Raising," "Apple, Peach and Plum Culture," "Small Fruits," "Spraying," "Good Roads," "Forestry," etc. During the afternoon session of the first day, the lady speaker took up, in the general session, some topics relative to the household or perhaps "Poultry Raising" or "Butter Making on the Farm," and the second afternoon conducted a Women's section. In a large number of counties there is evidently a growing interest in the subject of "Centralized Schools" and this was upon the program in no less than forty counties.

As the members of the College faculty are quite busy with class room work during the winter months, they were able to devote but little time to attending farmers' institutes, but quite a number of them were secured for a single week. There are a large number of others who devoted one or more weeks to attending institutes without recompense beyond their actual expenses, among them were Horatio S. Earle, of Detroit, State Highway Commissioner; Charles W. Garfield, of Grand Rapids, president of the State Forestry Commission and R. D. Graham, of the State Board of Agriculture. As in previous years, a considerable amount of assistance was furnished by the Superintendent of Public Instruction, Prof. Delos Fall and his deputy, Prof. Walter H. French, and others from the office, while Prof. George W. Loomis of the Central Normal School, Mt. Pleasant, attended institutes in three counties.

The separate women's sections appear to be growing in interest and attendance. In very few counties have they been given up, while a considerable number which have not held them in the past are thinking

of doing so in the future. Their success has been due both to the active interest taken in them by the women furnished as state speakers and to the work done by the presidents and secretaries of the women's sections. Where these officers have taken an interest in the matter and have thoroughly advertised the meetings, hardly a failure has occurred.

When the time came to locate the Round-up Institute, the universal opinion of all parties consulted was that it should be held at the Agricultural College and it was so located by the Board of Agriculture. The program in full is herewith submitted. In arranging for the meeting it was thought best to afford the visitors an opportunity to investigate the work being done by the College and that this might be possible without losing any of the program of the institute proper, arrangements were made for demonstration lectures by a large number of the departments each morning previous to the opening of the regular session of the institute. The exercises in stock judging, butter making, cooking, sewing, grafting, pruning, spraying, etc., were of much interest to those who were on hand to watch them and proved a very instructive part of the program.

In addition to the regular addresses and discussions, arrangements were also made for two or three pieces of music for each session. As will be noted in the program, the College cadet band, under the leadership of W. F. Jordan, and the M. A. C. orchestra, with Leon Netzorg as leader, furnished a number of selections, and the musical department of the College, under the direction of Miss Freyhofer, provided several instrumental and vocal pieces. As in previous years, when the institute has been held at the College, Superintendent J. E. St. John, of the State Industrial School for Boys, kindly consented to allow the choir and band of that institution to assist in the musical part of the program and on Wednesday and Friday afternoons, the visitors were more than pleased with the selections furnished.

L. R. TAFT,
Superintendent.

Agricultural College, Michigan,
June 30, 1904.

ROUND-UP INSTITUTE.

As it seemed to be the general opinion of the institute officers and workers that the Agricultural College was the best place for holding the Round-up Institute, the meeting was called at that place, February 23, 24, 25 and 26. The weather had been unusually cold and stormy and in some sections of the State the railroads were blocked so as to prevent the running of trains; many who expected to attend were unable to secure competent persons to look after their stock, while sickness made it impossible for others to attend. In spite of this, however, the attendance was fully up to the average and the Round-up Institute was considered by all to compare favorably with those held in previous years.

The State Dairymen's Association had for several years held its annual meeting in Lansing during the month of February, and a suggestion was made to the executive officers of the society that a joint meeting be held at the College. Similar invitations were extended to the officers of the Michigan Beekeepers' Association and of the State Horticultural Society. All of these were accepted and arrangements were made for special sessions of the societies in addition to the joint sections. The joint dairy sessions were called for Wednesday forenoon and afternoon; the session with the Michigan Beekeepers' Association was held Friday forenoon and that with the State Horticultural Society upon Friday afternoon. The State Dairymen's Association held meetings in the Senate Chamber of the State Capitol on Tuesday afternoon and evening and again on Thursday forenoon. The special meetings of the Beekeepers' Association were held in the College chapel on Thursday evening and Friday afternoon.

One of the interesting features of the Round-up Institute was the series of demonstration lectures given each morning by several of the departments of the College. Outlines of the work will be given later on in the report.

Arrangements were made with the students' boarding clubs to provide dinners and suppers for the visitors who returned to Lansing after the close of the evening sessions, and found lodgings at the hotels and boarding houses in the city. The street cars during the entire week gave excellent service and handled the crowd without any delays.

A souvenir badge was provided for the delegates and speakers. In addition to a ribbon giving the date and place of the meeting and the names of the societies with which joint sessions were held, it bore a medallion with the portrait of the late Hon. Franklin Wells, for nearly thirty years president of the State Board of Agriculture.

CONFERENCE OF INSTITUTE WORKERS AND DELEGATES.

On Tuesday afternoon the first session of the Institute was called to order by Hon. Charles F. Moore, of St. Clair, chairman of the Farmers' Institute Committee of the State Board of Agriculture. After brief remarks, in which he spoke of the value of the institutes to the farmers of Michigan and the benefits that were hoped for from the bringing together of the institute lecturers and officers of the county institute societies, Mr. Moore called for a report of the institute work done during the last year from the superintendent. This was in substance as given in the opening pages of this report. Brief reports followed upon the work (1) in the northern peninsula by A. P. Gray, (2) in the northern counties by N. K. Potter, (3) in the central counties by M. L. Dean, and (4) in the southern counties by George E. Rowe. Reports upon the one-day institutes were then made by N. P. Hull and W. F. Raven. In nearly all of the counties the reports show that the interest has been well sustained, although in a few instances, especially in the case of the one-day institutes, several partial failures were reported, owing to the fact that the county secretary, or the local manager in whose hands the arrangements for the meetings had been placed, failed to properly advertise the meeting. Several speakers advocated holding no meetings except upon the petition of five to seven farmers residing in the vicinity. A round table discussion upon various topics relating to the locating of institutes followed.

At five p. m. the conference adjourned to attend a demonstration lecture upon the X-ray by Professor L. G. Holbrook at the physical laboratory.

The evening session was called to order by Hon. Robert D. Graham, Grand Rapids, vice-president of the State Board of Agriculture. The topics presented were, "The Ideal Institute Worker," by Prof. C. D. Smith; "The Ideal Institute Program," by Colon C. Lillie; "The Ideal Methods of Advertising," by N. I. Moore; "The Ideal Methods of illustration," by L. W. Oviatt; "The Ideal Women's Section," by Mrs. F. D. Saunders and Mrs. C. M. Partch.

The round table discussion which followed took up, among other subjects, the number of speakers that should be furnished for each county institute, the length of time they should speak, and topics for an evening program.

THE STATE DAIRYMEN'S MEETING.

The opening session of the dairymen's association was called to order in the Senate Chamber at 1:30 Tuesday afternoon by the president of the association, Hon. Fred M. Warner. Alderman Lawrence Price, in the absence of Mayor James P. Hammell, welcomed the members of the association to Lansing.

In his response Hon. E. A. Blakeslee, of Galien, spoke of the wonderful strides in dairying that have been made in Michigan in the last ten years. The growing of wheat and other cereals has given way to the business of dairying. Under the grain system of farming, the lands became poorer, but now they are becoming richer each year under the new system of dairying. It is but ten years since the first creamery was established at Galien. It was a hard matter to induce the farmers to send their milk to the creamery, and in fact they had but a small amount to send. They would not go to the expense of buying a milk can and the hardware men of the town offered to furnish them cans on trial, and if they were pleased with the results obtained from the creamery they were to pay for them and if not they could return the cans. None were ever returned. The interest in dairying has spread until now there are six well supported creameries within a radius of 15 miles.

Michigan is well adapted to dairying, having a good climate, good water, good grasses, and besides it is a splendid State for cows and best of all is surrounded by the best markets in the world. Michigan is destined to become one of the leading dairying states in the Union.

PRESIDENT'S ANNUAL ADDRESS.

BY FRED M. WARNER, FARMINGTON.

Our products today are double what they were 10 years ago, still there is ahead of us plenty of work. While I feel no danger that Michigan will go backward in her dairy interests, I do not think that with proper management and necessary laws our State can get much nearer to the front rank than she is today. In dairy products no state in the union can produce a better article. Our natural advantages as regards climate, pure water, etc., are unsurpassed. It should be impressed upon all dairymen not only the desirability of keeping a better class of cows and endeavoring to constantly improve them, but also the import-

ance of giving them the best of care. There is no doubt that working along these lines the returns from the dairy interests may again be nearly doubled during the next two years. This fact should receive attention, and while we are making progress in our methods of handling milk, the marketing and manufacture of the product, let us not lose sight of the mainstay of the future prosperity of the dairy interests of our State and the very basis of our industry—the dairy cow.

Two important things that would greatly aid our dairy industries and so add much to the wealth of our State are dairy instructors and good roads. In 1902 and 1903 I called your attention to the importance of dairy instructors who should be appointed solely because of their capability to give instruction to the cheese and butter makers, and also to the patrons of the 400 factories now in Michigan. These should be under the dairy school of our Agricultural College and not be political appointments in any sense of the word. Our last legislature considered the appointment of two instructors which would have been a start in the right direction, but for some reason the bill failed in the house after passing the senate. The instructors have been a great benefit in the other states that have tried this system. New York has eight and Minnesota, which has lately made great progress in the dairy industry, has five instructors and field workers. Under the dairy and food commission, and in connection with the dairy school, neighborhood meetings are held in school houses and other convenient places to instruct the producers of milk and patrons of butter and cheese factories.

The good roads question that is now being agitated more than ever before should receive the careful attention of every dairy section. No one thing will assist more to build up the creamery or cheese factory than to have first-class roads in that locality. While better roads would be of great benefit to all, to those who use them daily they would certainly be a great boon. The present methods of road building are, as a rule, without system, intelligent supervision, or business management, and would not be allowed to continue in any other branch of our local affairs. With the raising of an amount no larger than at present, road building in our townships could be systemized, and our roads gradually but greatly improved. Instil into the minds of the people in your localities the necessity of acquiring the habit of building good roads. The cause is worthy of your effort. No doubt the time will soon come when the national government will lend its assistance in the construction of better highways. This should be done. If the national government can spend vast amounts in improving our rivers and harbors, and in the building of railroads, which is but another class of highways; if it can signal the weather, modernize farming, foster and encourage manufactures and aid and promote trade and transportation in various ways, there is no good reason why it should not assist in the building of better roads, the most useful and common of all interests it can conserve. This year we meet in conjunction with the annual State Farmers' Institute, and I trust we may be all much benefited by the change.

The report of the secretary and treasurer, S. J. Wilson, of Flint, showed receipts of $306.00 and disbursements of $322.30 in the current expense account. The promotion account showed receipts from member-

ship fees of $139.00 and contributions from various dairy supply companies to the prize fund of $185.00. Payments amouunting to $149.83 were made as premiums on the butter and cheese exhibited last year. He also reported $200.00 available for the payment of premiums awarded at this meeting.

The afternoon session was devoted to topics relating to butter making. The first speaker was J. F. Powers of Quincy, upon "Qualifications of a Buttermaker."

There is no secret in butter making; all that is required is skilled hands, hard work and patience. The success of the creamery depends largely upon the butter maker. He should be well posted in bacteriology and should be able to discriminate between valuable and useless inventions. He should be free from bad habits and in love with his business. There is today a good opportunity for young men, who are willing to work, to take up this calling, and the demand for skilled buttermakers is increasing each year."

Mr. C. D. Martin of Concord urged the importance of personal neatness in the buttermaker. Several other speakers urged the importance of cleanliness in the factory as well as upon the farm.

The topics discussed at the evening session related to the pasteurizing of milk and the making of cheese. Prof. John Michels, of the Agricultural College, claimed that the leaders in the making of butter are those who are pasteurizing the cream. Pasteurized butter has a mild flavor and is not always liked at first but good judges place it at the top. The pasteurizing of butter makes it more plastic, adds to its flavor and helps to preserve it. Several of these points were disputed by Major Henry E. Alvord, Chief of the Dairy Bureau of the U. S. Department of Agriculture, who claimed that pasteurizing instead of improving the flavor takes away the character from butter. It was used in Denmark to check the spread of contagious diseases and the Danish butter cannot be sold in the markets against the best products of American creameries.

Mr. E. Switger favored the thorough aeration of milk in order to rid it of objectionable odors and he also claimed that milk would keep longer without being cooled down. This was denied by Prof. John Michels of the Agricultural College who also claimed that if cold milk is added to warm milk, it will sour quicker than if it were kept separate. He also stated that milk exposed to pure air will develop more bacteria than if exposed to the air of the stable, not because there are more bacteria in pure air, but because their growth is more rapid when in milk exposed to pure air. The Michigan creameries are beginning to pasteurize their cream and we are now on the verge of a new development.

Prof. Michels at this time named the winners in the contest for the Bliss medals as follows:

Helmer Rabild, of Chesterfield and L. J. Heaton of Dorr, gold medals for creamery butter. Mrs. James Harris of Traverse City, gold medal for dairy butter. Fred M. Warner of Farmington, and C. L. Davis of Addison were awarded respectively gold and silver medals for cheese. In the absence of Gov. Bliss, owing to whose generosity the giving of the medals was possible, the presentation was made by his secretary, Major H. E. Johnson.

DAIRYING IN THE SOUTH.

(Abstract.)

BY E. N. BATES, MOLINE.

In many portions of the Gulf States milk of any kind—good milk, poor milk, butter-milk, skim milk, or any old kind of milk, brings ten cents a quart, summer and winter, and there is never enough to go around. It is not for want of a market that no more real dairying is carried on here, but it is for the want of grass. In Michigan grass grows everywhere. If a piece of land is cleared a spontaneous crop of grass will develop within two or three years, but I did not see a good meadow or pasture in Alabama and I am told it is impossible to grow either clover or timothy; in fact it is impossible to grow any kind of a crop there (except pine trees), without using commercial fertilizer to the extent of 25 per cent. of the value of the crop. While some corn is raised with the aid of fertilizer, only one stalk is grown in a hill and thirty to fifty bushels in the ear per acre is called a good crop. The ears and leaves only, are saved. The stalks, after being stripped, are left until spring when they are cut down, raked up and burned. The cows and other stock are left to shift for themselves through the winter months on such food as cotton seed hulls and a little cotton seed meal. Judging from the appearance of the stock it would seem to be good economy to save and feed the stalks. The butter and cream, as well as the milk, seen in the South are pure white.

STARTERS: COMMERCIAL AND HOME-MADE. HOW TO PREPARE AND USE THEM.

BY HELMER RABILD, CHESTERFIELD.

In the production of wholesome milk and in the manufacture of butter, bacteria play an all-important part. We have long recognized the fact that certain bacteria are beneficial and certain others injurious. It becomes, then, the office of the butter maker to encourage in the creamery the development of those bacteria which are his friends and to do away with or reduce to a minimum those that work injury. To accomplish this the scientist has taught us to make use of a starter. Starter, in general practice, is the name given to a mess of sour milk which in souring has developed that indescribable flavor and taste which is desired in butter; in other words, a starter is a collection of lactic acid bacteria.

A commercial starter is a pure culture of lactic acid producing bacteria, and contains only those species of bacteria that produce the desired flavor. In its preparation and its successful development much

depends upon the skill with which the butter maker is able to control the work of the bacteria.

I shall now proceed to explain how I handle a commercial starter and, as far as I am able, explain my theories for the different manipulations. As soon as I have received the pure culture from the laboratory I set to work to prepare my starter, or, if unable to do so immediately, I put it in the ice box in order to preserve it. In preparing my first batch of starter I use a half-gallon or gallon crock, the inside of which must be perfect and without cracks. In this crock, which I have found holds the temperature remarkably well, I put three pounds of carefully pasteurized milk of good quality and at a temperature of 80 degree, and to this I add half an ounce of culture.

In pulling the cork of the bottle I am careful to have everything germ free, and steam the cork-screw as well as the mouth of the bottle. I stir the mixture with a sterile spoon, cover the crock with sterilized parchment paper and set it away at a temperature of 80 degrees in the summer and at 85 degrees in the winter. In the course of eighteen or twenty hours it has soured sufficiently to become loppered. This first batch of starter generaly has an offensive flavor, but as the development proceeds through the following inoculations the flavor improves. With my three pounds of starter I inoculate two batches of pasteurized milk. The first batch consists of four pounds in a sterile half-gallon crock and to this I add about one-fourth pound of starter and set it away as on the first day, but at a temperature of 70 degrees in summer and 75 degrees in winter. This I call my mother starter. With the two and three-fourths pounds which I have left I inoculate 80 pounds of pasteurized milk at the above temperature in a ten-gallon can and place the can in water at a slightly higher temperature in order to keep the temperature of the milk as near 70 degrees as possible. The milk treated in this way will be ready to use in about 18 hours, so if the starter is set at two p. m. it will be ready for use at eight the next morning. I have my mother starter ripe at two p. m. ready to use for inoculation for my next day's starter. I always set my starter at the same temperature and the reason for this is my belief that the lactic acid germs do best at the temperature they are accustomed to. Likewise, I never cool my starter down if it gets ripe a little too early but instead of cooling it down add to it a little recently pasteurized skim milk and if this is lacking I use the best morning's milk I can get.

Bacteria growing under conditions most suitable for their rapid increase are more vigorous than at any other temperature and grow so rapidly that they smother or retard the growth of other varieties that may be in the milk. If you use the same temperature every day you know pretty near when the starter is going to be right, and can arrange your work so you will have time to give the starter proper attention. As it gets older, I use less for inoculation and always try to have it ready for use at the same hour every day. I don't let my starter get more than two or three weeks old before I prepare a new one as I find they lose their strength at that age, and I take extreme care not to let it get over ripe. About seven per cent. is the right acidity.

In making a home-made starter I proceed in this way: I go to a nearby farm and ask the farmer's permission to milk one of his cows and I always get permission. Before milking the cow I wipe the udder and

flanks with a damp cloth and do the milking in a pure atmosphere in order to obtain the right kind of bacteria. The milk thus secured, I cool down under constant stirring to about 50 degrees and take it to the creamery and set it away at a temperature of 80 degrees and it will always sour in from 18 to 20 hours. If the souring has produced the right aroma and taste I know the right kind of bacteria has had control of the fermentation and after this I treat the home-made starter as I do the commercial. I really believe I can secure a better flavored starter in this way than I can by developing my starter from a pure culture. Too much precaution to keep the starter pure cannot be taken. The Danish dairy maid who taught me to make the starter always made me don a clean apron before approaching the starter can and even went so far as to make me clean my finger nails and comb my hair. In the selection of a suitable starter can care should be taken to see that the inside soldering is smooth and perfect, as bacteria lurk in the cracks and grooves. The instrument with which the starter is stirred should be germ free. The best starter can I ever had was a ten-gallon can placed in an oil barrel full of water and with a steam and water connection.

I depend upon my starter to control the flavor of the butter and for this reason I skim a heavy cream, about 40 to 45 per cent., and dilute with one or two hundred pounds of freshly milked, good flavored morning's milk. In this mixture a good starter is enabled to get in its good work. The ideal way of using a starter, however, is in connection with pasteurization of cream, and I am surprised to note the slow progress the pasteurization cream system seems to be making in Michigan.

THE HAND SEPARATOR CREAMERY SYSTEM.

BY E. J. KNEIBEHLER, BAD AXE.

The hand separator creamery system has but recently been introduced in Michigan and many are of the opinion that its adoption in preference to the whole milk system is a step backward. There are, however, many advantages in separating the milk on the farm. A team will haul 1,000 pounds of butter fat at a load in the form of cream, while if hauled as whole milk seven or eight teams would be required. Besides reducing the cost of hauling the farmer has his own skim-milk in the best possible form for feeding and there is far less danger of spreading diseases among cattle than when skimmed milk from a large number of herds is brought back from the creamery.

Another good feature about the centralizing plant is that the farmer knows just what he is going to receive, as the price of butter fat is usually based upon the highest New York quotations. When the milk is separated on the farm, the dairyman is practically independent as he is not obliged to patronize a local creamery, but if they are not dealing fairly and honestly with him he can ship it to the city or to a central plant as he may think best. After the milk has been separated, which takes but little time, and the skimmed milk has been fed the

calves or pigs, it will be much easier to cool and keep in good condition a few pounds of cream than ten times that amount of milk. Then too there will be no danger of losing an occasional can of milk which has become soured.

TESTING AND SAMPLING.

The taking of a cream sample cannot be done in the same way as with whole milk. The use of composite samples is out of the question and each lot of cream should be tested when it is brought in. Instead of measuring the sample for the test with a pipette, a delicate pair of scales should be used, as the specific gravity of the cream varies according to its density or richness. The test bottle used for cream in large factories has an extra long neck, graduated to 55 per cent. so that cream of any richness can be tested without reducing the size of the sample. These bottles are more accurate than those ordinarily used for milk but they require a special testing machine.

RIPENING THE CREAM.

Many are of the opinion that hand separator cream does not require much ripening. If sour cream is brought in, it should be placed in a ripener by itself and given a thorough aeration. This sour cream can never be treated so that it will make a fine grade of butter, but 15 or 20 per cent. of a good commercial culture would do it no harm if prevented from becoming over ripe, by being kept at a low temperature. Cream containing 20 to 25 degrees of acid can be wonderfully improved by pasteurization, rapid cooling, and the addition of a liberal amount of good commercial starter. The process of pasteurization destroys the bacteria, thus giving the butter a better keeping quality and seems to eliminate many of the bad flavors, but if the cream is very bad it is impossible to get rid of them all. It is always desirable to have only sweet cream and if this is furnished to the hand separator factories they can turn out a finer grade of butter than the average whole milk creamery. When the hand separator factories realize the necessity of being more particular regarding the raw material they use, the whole milk creamery will soon become a thing of the past.

MERGING OF CHEESE SALES.

BY NORMAN B. HORTON, FRUIT RIDGE.

(Abstract.)

During recent years rapid strides have been made in the cheese industry in Michigan. The first cheese factory was erected in 1853, by Samuel Horton. There are now 150 factories in the State, which in 1903 used nearly one hundred and fifty million pounds of milk from which about fifteen million pounds of cheese were manufactured. Of these factories, sixty-two have been built since January 1st, 1900. The product of these factories is sold by the 127 owners or managers, each of whom is anxious to obtain all his cheese is worth but is willing to accept, in many cases, and if necessary, a large cut in the price rather than have the cheese left on his hands. Thus when the price fixed by the Utica and Little Falls Boards of Trade was 11 cents per pound, quotations were sent out from some Michigan factories placing the price at from 8½ to 8¾ cents. Such cutting and slashing is an injustice to the patrons of the cheese factories throughout the State, as the wholesalers not only gobble up the cheese but often use the quotation as a leverage in procuring other stock.

The cheese industry in Michigan has out-grown old methods. In New York they ran against the same snag but overcame the difficulty by establishing dairy boards of trade which meet every Monday for the purpose of agreeing upon a price for that week. Each seller hands in the number of cheese he has to offer and the secretary by summing up gets the total receipts. The price fixed is governed by the supply and demand. In Michigan the same course should be adopted. For example, four dairy boards of trade should meet, one in each principal cheese making district as at Adrian, Saginaw, Pontiac and Allegan. The factory men and buyers could get together at these points, and the cheese would sell on their merits and competition would encourage the making of a better grade of cheese. Competitive salesmen would be taken off the road and be brought together on an uncompetitive basis, so far as unnecessary slaughter in prices are concerned. It would reduce to a large degree the cost of selling the cheese and the board would be in condition to receive the latest dairy market reports from all over the world. The benefit derived from the dairy board of trade by the farmers through the increased price received by the manufacturers would be enormous.

Another plan for the merging of cheese sales is to have a general clearing house with several stations to which all cheese would be sent as soon as cured. This could be handled either by a stock company or by a co-operative concern composed wholly of factory owners. Under this system, the cheese could be held in times of over-production and prices could be retained on a firmer basis. The expense of selling would be reduced, general market conditions equalized and all worry would be taken off the mind of the factory owner, so far as disposing of his cheese is concerned.

JOINT DAIRY SESSION.

Wednesday Forenoon.

The joint session of the Round-up Institute and the State Dairymen's Association was held in the College Armory. The meeting was called to order at 9:45, by Hon. Fred M. Warner, of Farmington, president of the State Dairymen's Association. After an invocation by Rev. H. B. Bard, of the Church of Our Father, Lansing, President J. L. Snyder, of the College, extended an address of welcome to the visitors. He urged all to take occasion to visit the laboratories and lecture rooms of the College and see what work was actually being done. He called especial attention to the dairy herd of the College which contains representatives of more breeds than any other herd in the country.

It is, indeed, well that the farmers should regard the College as a sort of shrine, a Mecca to which they should make occasional pilgrimages. Whatever opinion one may have of book farming, were it not for education we would still be inhabiting log huts.

In his response, President Warner of the Dairymen's Association, expressed on the part of its members, their appreciation of the work at the College. The association has frequently met at the College in previous years and has never failed to profit by what they are able to see of its work as well as from the addresses by members of the faculty which always form an important part of each program.

Nothing that the State has done has been of more general and direct benefit to the farmers than the Farmers' Institutes and they should be in every way fostered and encouraged.

DAIRY COWS AND THEIR PROPER CARE.

BY COLON C. LILLIE, COOPERSVILLE.

The modern dairy cow is the result of long years of careful selection and breeding for the purpose of producing an animal that would convert the food grown on our farms into dairy products at the least possible cost. The same care has been exercised in selecting and breeding the modern beef animal, but for a different purpose. It is the duty of the beef animal to consume the food produced on our farms and store it up in his body in choice cuts of beef. Originally, away back in cattle history, there was but one breed and one type, that probably bred true to this type. This breed had the inherent ability to produce both flesh

and milk from the same food, but had no marked excellence in either. Man took this one type of cattle and moulded, on the one hand, the modern dairy cow, with her structural characteristics, and on the other the modern beef cow, with her structural characteristics.

While it is true that both of these types have their peculiar characteristics, they have not been bred long enough along these lines so that a breeder may feel absolutely sure of results in mating his animals. Some of the beef breeds have individual cows of dairy quality, and the dairy breeds contain cows that are not dairy animals. But a majority of the progeny are true to type. Hence, when we breed dairy-cows we can expect that a large percentage of the heifers will develop into profitable dairy cows, and when we breed cows of the beef or so-called dual purpose breeds, we can with equal certainty expect a large percentage of the offspring to be good beef animals and not good for dairy purposes.

This being true, to make the most out of dairying special dairy cows should be selected to compose our herd.

No matter how much care has been used in choosing our cows, they should be tested annually and the poorer cows of the herd disposed of. This is the only way to improve the herd or keep it up to a high degree of excellence.

YEARLY MILK RECORDS.

To determine the value of a dairy cow we must know how much milk she will give in a year and how rich that milk is in butter fat. The dairy form alone will not do, we must have performance. That is the practical test. All good dairy cows have the dairy form, but all dairy cows that have the dairy form are not good ones.

To know the amount of milk a cow will give in a day or a week, or even a month, is of no particular value. What is valuable is to know the amount of milk she will give in one year, because we have to keep her for the year. Quite often the cow that gives a wonderful flow of milk when fresh drops off in her flow of milk in a short time and does not produce as much in a year as her more modest sister that starts in at a more moderate gait, but continues on well through the year. The milk should be weighed every night and morning, the extra trouble being a good investment for another reason, as the milkers will take more interest in their work if they record the milk at every milking.

TESTING FOR BUTTER FAT.

In testing the milk for butter fat, many make a mistake in not getting a correct sample of milk. Most of the fault found with the test in our public creameries is due to this fact.

When we begin to milk a cow the cream at once commences to rise to the top, and if when through milking a sample be taken from the top of the pail this is perceptibly richer than at the bottom of the pail. The milk should be turned from one pail to another several times to get the cream evenly distributed and then a sample taken. Again, a cow gives richer milk at one milking than at another. The milk may vary as much as 1 per cent. in butter fat from one milking to another. Hence a composite sample of at least four consecutive milkings should be taken, to eliminate this chance of error. Again, a cow gives richer milk

when well along in the period of lactation than when fresh, and we should test her when fresh, again near the middle of the period of lactation, and again near the close, and average these tests to get the normal percentage of butter fat which the cow gives.

Now to multiply the number of pounds of milk the cow gives in a year by the percentage of butter fat gives the number of pounds of butter fat the cow will give in a year. Reducing this to merchantable butter by adding one-sixth of itself and we have the pounds of butter a cow will give in a year.

A STANDARD FOR BUTTER PRODUCTION.

How much butter ought a cow to produce in a year to make her profitable? Mr. Gurler, the author of American Dairying and a practical dairyman, says there is no profit for him in a cow that produces only 200 pounds of butter in a year. Figure the labor, interest on the money invested and the cost of feed, he says, and it takes about 200 pounds of butter to pay the bill. Then, if that statement is true, our standard should be higher than that. So we might begin by assuming 250 pounds of butter as our standard, and at the end of the first year dispose of all the cows that will not come up to that standard. The next year we can raise the standard to 300 pounds, and later on make it still higher. Many dairymen now will not keep cows that do not average 400 pounds of butter in a year. And when we consider that individual cows have produced 500, 600, 700, 800, 900 and even more than 1,000 pounds of butter in a year, we realize that there is plenty of chance for development in the dairy business.

BREEDING THE DAIRY HERD.

When we have selected out the unprofitable cows then we should breed the remainder to the best sire obtainable. He should be of unquestionable breeding. We would like to have his sire a producer of dairy cows with a splendid dairy cow for mother. And we want him to be a splendid individual, showing constitutional vigor and possessing masculinity and courage. But with all this the only real test of a good sire is the heifers that he will produce. Are they good or are they common? This tells the story. If they are satisfactory then we have drawn a prize. If not we have drawn a blank.

The great drawback to improvement in the breeding of our domestic livestock is continually changing sires. We change too often before we know the effect the sire will have on the herd.

CARE OF THE HERD.

The whole subject is expressed in the one word "comfort." Make the dairy cow comfortable and she will yield you a profit. Ex-Govenor Hoard of Wisconsin, editor of Hoard's Dairyman, says we must if we wish to make a success of dairying, treat the dairy cow as a mother, and I am sure he is right. You must treat the cow gently, get on the right side of her, coax the milk out of her rather than try to force it out.

The dairy cow is susceptible to inclement weather and she must be protected from cold and storms to do her best. A good rule on a

dairy farm is to not allow the cow out of doors when it freezes. She should be protected against frost. The dairy barn should be warm, at least forty degrees above zero. It should also be light. Have plenty of windows. Sunlight is the best medicine a dairy cow ever had. It is much cheaper than paying veterinarians' bills. There is nothing that will prevent and hold in check the disease-producing germs like sunlight. Have the stable as light as our own living rooms.

Besides being warm and light, the dairy barn should be well ventilated. Cows consuming heavy rations and producing large quantities of milk, must have plenty of pure air. It is absolutely necessary. This can be supplied by properly regulating the windows, but the best way is to build a chimney on one side of the stable, with the opening at the bottom like an old-fashioned fire-place, for the impure air to pass out, as the impure air is heavier than pure air and settles to the bottom of the room. Then take in the pure air at the ceiling. To avoid drafts have a box extend across the ceiling of the stable and put auger holes in the bottom of it, so that pure air will pass through these small openings and avoid all drafts. This system will save the warm air in the stable, which is near the ceiling, and will hold the stable at the proper temperature.

Besides being warm, light and well ventilated, the dairy barn should be dry. Conduct the water from the eaves of the barn away from the building, tile drain the land near the barn and have no water-soaked soil near to cause dampness. Proper sanitary conditions cannot be secured unless the ground is dry.

A WORD ABOUT FEED.

We can comply with all other conditions, but unless the dairy cow is well fed she cannot produce a maximum flow of milk. And here I wish to add that the drinking water must also be pure and abundant. We not only must feed the cow well, but we must feed her as cheaply as possible. Competition is so close, wages are so high that no extravagance can be tolerated here or there will be a loss instead of a profit. I am convinced that for the Michigan dairyman there are no better foods than clover hay and corn silage. Every one should have these in abundance. But the dairy cow cannot do her best on these alone, for they are too bulky. She cannot eat enough of them to do her best, and must have some concentrated food as well.

No better food can be obtained than peas and oats for a grain ration to be fed with clover hay and corn silage. Peas are rich in protein and help balance the excess of carbohydrates in the corn silage. Generally, we can buy a protein food cheaper than we can raise it on our farms. The American farmer has a splendid opportunity to buy the waste products of our flour mills, linseed oil mills, our cotton oil mills and our glucose sugar mills, and he may buy in this way that food in which he can get a pound of digestible protein for the least money.

With proper care in the selecting, breeding, care and feeding of the dairy cow, no man need complain that dairying does not pay.

Colon C. Lillie: A poor milker in the stable is a bad investment and when one has a good man he should be retained. It is better to have the same man milk a cow continuously rather than keep changing

milkers. It is also unwise to change the feed suddenly, and if some new feed is to be given them, the change should be gradual. It is often claimed that turnips, beet tops and silage taint the milk but if they are properly fed there will be no taint.

Prof. C. D. Smith: I protest against the feeding of silage before milking, as I consider it entirely wrong to do so. Silage should be fed after milking. If this is not done the effect will be immediately noticed in the milk, which will be tainted. The injury is often even more noticeable when dry fodders are given to the cows either just before milking or while milking is going on.

C. C. Lillie: I heard you say once that you milked cows and put the milk in a silo and it had no effect.

Geo. F. Richardson: When ensilage is fed either just before or during the milking period the milk will surely be tainted.

The remarks of N. P. Hull, of Diamondale, who opened the discussion, were as follows:

Despite all that has been said and written on the Feeding and Care of the dairy cow, the average production of the cows of Michigan, is not much, if any, above the average cost of production. However, this does not prove in any way that dairying cannot be made to pay a steady, continuous and splendid profit on our Michigan farms. Perhaps in no line of work are there greater differences between averages and possibilities. The first essential for maximum production is a good herd of cows. It is not enough to know that the herd is producing profitably, but we should know that each individual in that herd is a profitable animal. In determining this, while we should not neglect the point of conformation as indicating dairy temperament, yet the only safe tests are the scales and Babcock tester. And even then we should not condemn an animal until we know that she has been properly fed and cared for.

For the ideal dairy cow, with the nervous susceptible temperament that responds so royally to proper conditions, may be the first to fail if given unkind treatment, poor or insufficient food, and uncomfortable quarters. It requires about one-half of all a cow can eat, digest and assimilate for the maintainance ration, i. e. just to keep her a cow; or to keep her milk giving machinery running. Manifestly there is no profit in just running the machinery and it is equally clear that in feeding for maximum profits, we must make the conditions right so that this machine, that is costing so much to run, shall eat, digest, assimilate and convert into milk just as large an amount of food in proportion to that required to run the machine as is possible. To bring this about, the cow must have a ration composed of the necessary food elements, so compounded as to have about the right proportions.

Succulent food during the winter season is desirable. I know of no better food of this character than the corn plant properly ensiloed. A cow should be fed regularly and with a variety of food, of which 25 to 35 per cent. of the digestible nutriment should be in the form of concentrates. We believe it to be very essential that the food before a dairy cow, should smell right and taste right to be palatable. That it

shall be required that the mangers be kept clean, and that the hay, stover and ensilage be harvested and properly cured when they contain the largest amount of digestible nutrients; and the concentrates should be clean and sweet. The dairy herds of Michigan that are being so fed, that are warmly and comfortably housed, and are given but a limited amount of exercise, aside from that of elaborating milk, are, I believe, doing more to improve the condition of the farmer and his farm than any other line of live stock husbandry.

MARKET MILK.

(Abstract.)

BY HENRY E. ALVORD, CHIEF OF THE DAIRY DIVISION OF THE U. S. DEPARTMENT OF AGRICULTURE.

During the last few years the production of milk for the supply of families living in cities and villages, as well as for creameries and cheese factories, has undergone a wonderful development. There is, however, plenty of room for improvement and attention can well be paid to the best methods of producing high grade milk. There is today a vast amount of inferior milk placed upon the market. In the cities the boards of health have arranged for the inspection of milk and this has a good effect upon the demand, as the consumption of milk increases as the confidence of the public in its purity and high quality advances.

The sale of whole milk from the farm has a very injurious effect upon the fertility of the soil and the original productivity of the farm, when the milk produced is sold off the farm, unless some means of fertilizing and the replacing of the plant food thus disposed of are used. When one is in the business of producing market milk the location and means of transportation are of the utmost importance and good roads are essential if the market is to be reached.

It is entirely possible for a dairyman to purchase his cattle foods and to produce his milk at a profit even though he has no land but that on which his buildings are situated. While the farm buildings need not be elaborate or expensive, they should be convenient and adapted to the purpose. Although it need not be as warm, in other respects the building in which cows are kept should be a fit place for a man to live in. In the market milk business the use of pure bred cows is not advisable. A business of this kind cannot be successful without personal supervision as there are few hired men who can be relied upon to look after all of the details of caring for the cows, and see that the milk goes from the cow to the consumer in the proper condition. Cleanliness, begins upon the premises and includes the owner and his assistants. Nine-tenths of the charges of uncleanliness in milk should be made against the men who have her in charge, and not against the cow.

The odor of the stable nearly always comes from the milk man and not from the cow. All disturbances such as feeding should be put off until after milking. Nothing should be done in the stable within one hour

previous to milking in the way of handling feeding material, or cleaning out the stables. Everything possible should be done to keep the milk pure. Aerating, filtering and pasteurizing are at best but purifying methods. The thing that we should demand is milk that does not need purifying. Wherever we find bacteria and dirt they leave their trail and taint behind them and there is no complete remedy.

Although it may be valuable and even necessary under certain conditions, pasteurization is wrong in principle. It is often used as a cover to a multitude of the sins of dirt. It is nothing more than a corrective and it tends to carelessness. Some milk men seem to think that whatever happens to the milk, even if the cow puts her foot into the pail, it will be corrected by this wonderful process of pasteurization. Pasteurization is often a humbug, as in many cases when the claim is made that milk has been pasteurized it is fraudulently made. Although the milk may be advertised as pasteurized, the process is often improperly or imperfectly done and the last state of that milk is worse than the first. Pasteurization is one of the fads of the day and may be used as a cloak for deception. In some cities the dairy wagons bear the sign, "pasteurized milk" when it never has been pasteurized, or at best perhaps only half pasteurized, and the public in this way is deceived.

To my mind pasteurization is extremely repulsive and is suggestive of "made over butter." It is claimed by its advocates that pasteurization kills the germs. Granted that it does. Then we have the milk full of the "remains" of these animals, or bacteria, and the germs are not removed unless in the sense that a deceased citizen is "removed." Cleanly production and protection is the secret of pure milk. The milk should be cooled and kept clean, and in this way only is it possible to produce the sweetest and purest of milk.

The discussion of the address of Major Alvord was led by Ira O. Johnson, of Grand Rapids, who said: Dairymen in the western part of the State who feed ensilage to their dairy cows before milking, obtain for their milk the very highest prices. It is not possible to produce a high grade of milk at only five to six cents per quart, and to furnish pure milk and make a profit the price should be not less than seven cents. Many consumers prefer to buy pasteurized milk at five cents per quart rather than to buy pure milk of high quality at seven cents. As long as the consumer wants cheap milk just so long will pasteurization be common in the production of milk for city consumption.

Geo. J. Baker: I would like to ask Major Alvord what he considers the ideal milk package for the trade?

Major Alvord: While it is too early as yet to state definitely what the style of package will be, I am of the opinion that it will be some cheap receptacle which can be destroyed after being once used, the same as the paper pails now used for oysters.

The remainder of the morning was taken up by a warm discussion regarding the benefits of pasteurization. The paper of Professor Marshall upon "Bacteria in Milk" was put over until the afternoon session owing to a lack of time.

Wednesday Afternoon.

The afternoon session was presided over by Hon. Geo. B. Horton, of Fruit Ridge, Master of the State Grange, who opened the exercises with a short address.

The program was enlivened by several songs by the choir of the State Industrial School for Boys, whose efforts received several encores and by a recitation by Mr. Bert Wermuth, who rendered a scene from Shakespeare's "Brutus and Cassius," in a very acceptable manner.

INTRODUCTORY ADDRESS.

BY HON. GEO. B. HORTON, FRUIT RIDGE.

Ladies and Gentlemen:—I appreciate the honor conferred upon me through an invitation to preside over your deliberations for a short time. The honor is greater because of the representative character of the assembly and the vital importance to the State of the varied interests represented. We have here the leading thinkers and participants in the promotion of the various branches of that greatest of all productive industries, agriculture. Experts in scientific research and education including domestic science and economy, practical operators in soil culture, successful live stock breeders and feeders, the best the State affords as producers of fruits, cereals, butter, cheese, and very fittingly the matrons of that greatest of all American institutes, the home, where the results of all labor are finally employed; all here in numbers to make up the personnel of this audience. And this is not all that goes to raise the standard of the practical and the intellectual character of this concourse of people. We live in a land where educational privileges are unexcelled, and being of a progressive stock our people take advantage of this so that reading and thinking is a common employment and this results in a State yeomanry of good general understanding. Prominent among these helpful agencies and as strong supports to our schools are the Farmers' Clubs and Granges of the State, numbering fully 1,000 and holding in the aggregate more than 20,000 meetings annually. At each of these meetings privileges are given for reading, reciting, debating and considering questions of a wide range of local and public importance.

Then we must not overlook our extensive system of Farmers' Institutes, with this grand meeting intended to concentrate the best thoughts and the most practical experiences which have been developed during the year. Moreover, people with such inherent ambitions and such high ideals as are possessed by those who settled and developed our State up to the present proud position among all the states, do not confine their observations and inquiries to their immediate occupations and near-by environments, but, instead, they fully comprehend and exercise the privileges of citizenship and obligations to society. We, therefore, have before us today a large audience of typical American people appreciative of *all* they may and do enjoy.

It is interesting to note some of the important changes in the agriculture of our State during the past few years. During the years from 1886 to 1891, I was given the privilege of presiding over the deliberations of the Michigan State Dairymen's Conventions. I remember that I gave prominence in my annual address to the fact that the agriculture of our State was in an unsettled and drifting condition. Whereas, Michigan had been a stock raising, a wheat and wool producing State, for many years previous to that time, the broad range pastures of the Southwest had taken from us the cattle, the sheep and the wool, while the great Northwest had through its natural advantages influenced cheap wheat production to such an extent that it could not be produced upon the improved farms of Michigan with profit. Being deprived of those farm products which had been the main dependence of so many of our farmers for so many years, a time of uncertainty was upon us, and speculation as to the result was common. In our dairy conventions it was pointed out that Michigan occupied a central position in that strip of country from Vermont to the Mississippi River and including the eastern half of northern Iowa and southern Minnesota, known as the "Dairy Belt," and which must furnish the larger portion of the dairy products for the whole country. Thus it was urged that creameries and cheese factories and general dairy farming could very profitably take the place of a part of that which had gone from us. From that time Michigan has developed into one of the recognized dairy states of the Union, not only in quantity of production but in high standard of quality as well. It was also soon learned that mixed farming with dairying was a process especially desirable for the purpose of receiving and bringing back to a natural condition of productiveness the worn out wheat fields of the State. About the same time, the discussion of sugar beet and beet sugar production came into prominence, championed by the late Dr. Kedzie. That industry is now one of chief importance to the State.

Then, resulting from that forced recognition of our farm operations, came a wonderful development along horticultural lines, and the introduction of many specialties, some of which give Michigan prominence, as shown through the potato and bean crops. Now that we are well settled in all of these new methods, we have received the cheering news that, in the matter of wheat, beef, mutton and wool, our farms have been moved back from the western plains to the old locations and we are again permitted to produce these great staples at a fair profit. Verily, the farmers of Michigan are especially favored at this time. Our State is situated in the middle ground territory and within the track of commerce between the great producing and consuming parts of our country and the world. We are blessed with soil and climate conditions which make our agricultural possibilities both broad and elastic. We are now settled and well versed in the actual production of a greater variety of farm products than almost any other state in the Union.

You are assembled at this time as representatives of this favored people to express such thoughts and to promote such acts as will perpetuate the many blessings which are now enjoyed. Amidst all of this, do not forget your citizen duties. The farmers of Michigan are in position to wield a commanding power if they are assertive of their desires. In exercising this power let fairness and justice to all be the governing motto.

In politics the farmers are considered the great conservative class. While this is an enviable position to occupy, you should not go to such extremes as to sit in a silent and martial attitude, while others, with maybe selfish motives in view, do all the planning and leave nothing for you but to fall into line and endure. When you are through with this session, you will go to your homes and your farms with a more complete understanding of your business, your duties to society and to your State.

Hoping for a profitable session this afternoon, I will take up the program as prepared for you.

SOME ACTIONS OF BACTERIA IN MILK.

BY PROF. CHARLES E. MARSHALL, AGRICULTURAL COLLEGE.

For some years I have been especially interested in the study of the production of pure milk. It has always seemed to my mind that most of our difficulties in the making of butter and of cheese and in the furnishing of good milk for city consumption may be traced directly to the dirt which enters the milk after it leaves the udder of the cow. This may be demonstrated plainly and forcibly by the use of a few sterile flasks of milk which may be inoculated with those elements likely to enter the milk during the milking process and during its handling before it reaches the dairy. If our assumption is true, it is pertinent to say that dirt is introduced into milk, and its effects must be overcome in one way or another after such introduction or, in other words, we must undo some acts which we have already executed. It is, therefore, evident that we are not consistent in our milk manipulations and whether we are practical or even right remains for time to demonstrate. It is now becoming a question whether it is cheaper to pasteurize than to produce pure milk when judged from the financial standpoint. The future will be able to solve this question and we shall know whether pure milk may be produced with the same economy as milk which is full of pollution.

It is certainly gratifying to note that many who, three or four years ago, would not even entertain the idea of producing a pure milk, are at present basing their claims for progress and advancement upon this very commendable notion. They are advocating cleanliness in milk production and one of these men has gone so far as to say that all future progress in dairy work is bound up in the ability of the farmer to produce a purer milk. This man claims that our cheese cannot be improved much, our butter will remain where it is, and our milk supplies will be chaotic until the milk producers themselves shall see the force of pure milk.

Today it is not my purpose under the subject given to discuss the various possible actions of bacteria upon milk, for I shall assume that you are acquainted with many of these actions, and to help out this matter, I have prepared several flasks to indicate certain changes which may result from the action of bacteria. My efforts for the

present shall be centered upon a single theme which heretofore has not been emphasized and has not even been understood.

We have always worked with the impression that milk soured from the multiplication of lactic acid bacteria, and that these bacteria through the vigor of their growth supplanted all other germs present. Further, these lactic acid germs we have understood to overcome all of the possible changes and damages that might occur from the other germs which are present or are associated with them in the milk. What I have to say in regard to this assumption is not in any way going to conflict with our intimate understanding of the souring of milk,—this process takes place from the action of the lactic acid bacteria upon the sugar of the milk, producing lactic acid and sometimes carbonic acid gas. This is simple lactic fermentation. By the formation of the acid the casein of the milk is curded, thus we have loppered milk. But it is erroneous to think for a minute that the other micro-organisms present in the milk have no influence upon this lactic acid fermentation. Here is where we have erred, for we are able to demonstrate beyond a doubt that where certain germs, diametrically opposite in their nature to the lactic acid bacteria, when associated with them are in some instances able to hasten the souring of the milk by ninety-six hours, and in other cases they retard the souring of the milk, thus making the process slower. If we were to work under the old assumption we would conclude that the lactic acid bacteria would eventually take care of any damage done by these associated bacteria; this is false. Through the association the results are quite different; in one in the rapidity of souring, in the other in the amount of acid produced, and also in others in the flavor and aroma of the milk. From the work we have done, it follows that a pure milk supply is essential if our starter consisting of lactic acid bacteria is going to perform its best work; because, if you simply add a starter to cream or milk containing these other bacteria, you will partly correct the mischief done but it will be of a very imperfect correction. Again, one might assume that by pasteurizing and killing most of the germs present and then using a starter a complete remedy would be furnished. This is also false because I find that even after pasteurizing the products produced by the germs associated with lactic acid bacteria are sufficiently stable to remain in the milk. While pasteurization is corrective, it is by no means as good as pure milk. Still, again in the manipulation of the starter it has its bearing because the starter is usually continued in pasteurized milk only. Doubtless the starter many times may remain intact and free from contaminating influence yet there is always that possibility of associative action from other germs which will lead to a destruction of the value of the starter. I am informed by Mr. Michels that after he has kept his starter for some time in the usual method employed in a progressive dairy he finds that it becomes too sour for satisfactory work and does not possess the value it formerly did. It is probable that such changes are induced by the development of these associative germs. In my own work I have been able to demonstrate, that as the lactic acid bacteria were influenced in their development by certain associative germs, the acidity of the culture could materially increase. I believe also that I can demonstrate that where we have associated

germ-action in which one of the germs is the lactic acid bacterium, the curd resulting does not possess the characteristics as where the lactic germ alone is at work. The examples which I show you, will illustrate my meaning clearly. The lactic acid germ produces a soft, velvety curd, while in most cases when associated with other bacteria the curd is mushy; therefore, when you consider that the association of bacteria will influence the keeping quality of the milk, the acidity produced, the influence of the starter, the continuance of the starter, the nature of the curd and the flavor and aroma, can you conceive of a more potent factor in the manipulation of milk and its products? What is true of the lactic germ associated with other bacteria is to a greater or less extent true when different types of bacteria are brought together. However, when different types than the lactic acid bacteria are brought together the effects, although noticeable, are not so easily made applicable.

In our work upon aeration and other problems carried out for the purpose of establishing the necessity of a pure milk supply, we have always been met with the statement that the lactic acid bacteria would eventually predominate and take care of the other bacteria present. From the above it will be seen that this cry is now impertinent. There is only one way of securing good results and that is to keep micro-organisms out from the start. If milk can be produced pure and kept cool, the danger in butter and cheese making will be minimized.

THE DAIRY HERD AT THE MICHIGAN AGRICULTURAL COLLEGE.

BY PROFESSOR R. S. SHAW.

It seems particularly desirable at this time that attention should be especially directed to the methods employed in handling the college dairy herd and some of the results from it. Some few years ago this herd was handled in such a way as to produce records which attracted the attention of dairymen throughout the whole country, besides adding much to the reputation of those famous dairy breeds, the Holstein and the Jersey. The dairy reputation of the Michigan Agricultural College is quite closely associated with the performance of Rosa Bonheur, Belle Sarcastic, Houwtje D and College Pogis.

The institution is fortunate in being possessed of a comparatively new and commodious dairy barn of which the main part is 44 x 72 feet and the annex 40 x 75 feet. The height of the main posts is 22 feet, while those of the annex are 18 feet. The ground floor is so constructed as to provide stalls for about fifty head of milch cows and heifers, also fourteen box stalls for calves and calving cows, and three pens for bulls as well. A variety of stall fixtures are in use, the object being to examine into the relative merits of each. Probably one of the most commendable features of the structure is the efficient system of ventilation used, by which the impure air is removed and

the fresh cold air admitted without coming in contact with the animals before being tempered by the warm air near the ceiling.

The College herd at present consists of sixty-four registered animals of various ages, representing the following breeds: Holsteins, twenty-six head; Jerseys, seventeen; Brown Swiss, ten; Red Poll, four; Ayrshire, three, and Guernsey, two. This herd is largely based on ancestry of remarkable performers. The Holstein herd is composed largely of the descendants of three cows whose records are hereafter given which were made in the years 1894 and 1895.

ROSA BONHEUR.

Milk for one year	17,043.45	lbs.
Butter for one year	547.52	lbs.
Milk for one day	106	lbs.
Butter for one day	3.587	lbs.

BELLE SARCASTIC.

Milk for one year	21,075.8	lbs.
Butter for one year	738.23	lbs.
Milk for one day	81.9	lbs.
Butter for one day	2.85	lbs.

HOUWTJE D.

Milk for one year	19,025.00	lbs.
Butter for one year	770.16	lbs.
Milk for one day	93.00	lbs.
Butter for one day	2.45	lbs.

The question is frequently asked as to whether any of the descendants of these three cows will be likely to attain performance equal to their noted ancestors. We believe there are young females in the herd today possessed of great possibilities. We are hoping for excellent results from these young animals but may not subject them to extreme record making conditions.

The Jersey cows are possessed of remarkably good size and indications of strength of constitution. They are also possessed of capacious and shapely udders. These animals nearly all have an infusion of Pogis blood, tracing back to the cow, College Pogis, which made the following record at this institution a few years ago, viz.:

COLLEGE POGIS.

Milk for 399 days	11,293.00	lbs.
Butter fat for 399 days	551.88	lbs.
Butter for 399 days	643.76	lbs.

Notwithstanding the fact that the present method of feeding is not a forced one for record making, but simply good, moderate, practical feeding, some of the Jerseys in the College herd produced as follows during the last period of lactation, which in no case exceeded twelve months and in general averaged about ten and one-half months:

College Pandora, 6,758.6 pounds milk and 438.49 pounds butter.
College Pogis, 4th Pet, 7,753.6 pounds milk and 425.3 pounds butter.
College Pogis 4th, 7,413.1 pounds milk and 405.3 pounds butter.
College Pogis 3d, 7,186.3 pounds milk and 392.4 pounds butter.
College Content 2d (heifer) 6,012.7 pounds milk and 353.5 pounds butter.

No less remarkable were the results secured from the Brown Swiss, a strictly dual-purpose type, which, to the dairy specialist, appears to be too large, coarse and beefy, with too much bone, too large joints, and too thick skinned for milk producers.

The records for the last period of lactation not exceeding twelve months from four Brown Swiss cows are as follows:

Becky, 9,655.3 pounds milk and 424.9 pounds butter.
College Becky, 10,156.2 pounds milk and 456.29 pounds butter.
College Becky 2d, 9,477.8 pound milk and 418.3 pounds butter.
College Bravura, 8,120.1 pounds milk and 406.3 pounds butter.

These cows received the same kinds of food and the same treatment as the balance of the herd. The ability of this breed to produce a good class of beef steers is being studied by the College and fat steers are being brought to the block to undergo slaughter tests.

The dual-purpose Shorthorns, owned by H. H. Hinds, were tested as regards dairy production also during the last year but under somewhat different conditions from the rest of the herd, giving the following results during twelve month milking periods:

Mary Wellington 5th, milk, 8,696.4 pounds; fat, 338.16 pounds; butter, 394.52 pounds.

Lady Knightly 15th, milk, 9,710.9 pounds; fat, 348.15 pounds; butter, 406.17 pounds.

Pansy of Stanton 35th, milk, 10,054.8 pounds; fat, 391.35 pounds; butter, 456.57 pounds.

The Guernsey cow, Bonnie May, made 447 pounds of butter during twelve months of her first period of lactation.

During our last dairy year ending about October 1, 1903, the average production from twenty cows in the herd, consisting of the various breeds mentioned, was 7,444.28 pounds of milk and 343.67 pounds of butter. As it has been estimated that the annual butter production for the 534,000 milch cows in the State of Michigan does not exceed 200 pounds per capita, it will thus be seen that the possibilities of improving the productiveness of the dairy cow in general are great.

The chief objects of the present method of operation are to follow as closely as possible along lines of practical feeding and management with a view to economic production rather than to attempt the establishment of records under methods inapplicable by the ordinary producer. Attention is especially directed to the investigations now in progress looking toward the determination of the relative values of dried molasses beet pulp versus dried beet pulp.

The discussion of Professor Shaw's address was opened by Mr. E. A. Croman, of Grass Lake, as follows:

Those who were at the barns this morning during the hour devoted by Professor Shaw to the judging of dairy cows and have again listened to him here, know as much about the College dairy herd as I do. Ten years ago, when I began selecting a dairy herd, I made frequent trips to

the Agricultural College to learn how to select a dairy cow. It was a pleasure for me to come here and look over the College herd. When Professor Smith had it in charge it was certainly worth any dairyman's time to inspect the herd frequently. Since that time several changes have been made in the management, and this has always resulted in a change in the policy regarding the breeding and care of the herd. It cannot be expected that a herd will be improved and bred up under such changing conditions. I believe that now we have a man in charge who has intelligence and ability to place the herd in a position where it can do the dairyman in Michigan a great amount of good. Let us as dairymen stand by Professor Shaw and render him every assistance in our power and thus help to build up this great and growing industry in our State.

The State Board of Agriculture should be impressed with the importance of permanency, so far as the persons who have in charge the various departments of the College are concerned, and they should not allow other institutions, by offering a large salary, to take away the members of the faculty just as they are getting a good hold upon the work of their departments and are able to be of some assistance to the farmers of the State. If increased means are required for doing this we should demand of the members of the legislature that they appropriate enough money to maintain the different departments of the College and furnish them with funds to properly supply them with the working material they need. Especially should we demand this for one of the most important, the dairy.

SOME DAIRY ECONOMIES.

BY C. D. SMITH, DIRECTOR MICHIGAN EXPERIMENT STATION.

I shall not waste your time and insult your intelligence by trying in this brief paper to review the whole field of milk production with the expectation of calling attention here and there to minor points in which better financial returns might be expected from the adoption of more economical methods. At this late day, after all the good work done by the stations, the newspapers and the farmers, it is safe to assume at the outset that all dairymen agree to the proposition that none but cows adapted to the dairy should be kept in it, whether Jerseys, Guernseys, Holsteins, or Shorthorns; they must all come up to the standard in the matter of large production and richness of milk. It is agreed also that the dairy form does indicate something tentatively as to the capability of the cow along this line and that the Babcock test must be used with the indications of the eye and hand to select the members of the permanent herd; that calves do not always, perhaps not generally, show the dairy form in all its intensity until after the birth of the first calf and that therefore the selection of calves to raise should be based on the excellence of the dam and the dam of the sire and the pedigree generally, rather than conformity to some arbitrary standard whether set up by some coterie of breeders or imagined by the farmer himself.

We may assume, as axiomatic also, that all dairymen are agreed upon the general proposition that enough protein should always be supplied the dairy cow when in milk, regulating the quantity of protein not alone by the weight of the cow but as well by the weight of her mess and securing the protein from the cheapest source, whether purchased or home grown.

It might be worth while to stop here long enough to call attention to the economy of producing more protein on the home farm rather than buying. The crops to be selected for this purpose are: First, clover; second, soy beans, the seed of which contain almost as much protein as cotton seed meal and more than either bran or average linseed meal; third, peas and oats and, fourth, in favored regions, alfalfa, the newest and most treacherous legume we have to deal with. Whether to grow either of these crops except clover depends upon the environment of the farmer, the cost of labor, the relation of the size of his farm and the number of cows kept and the other factors in the ration.

The silo is an essential factor in economical milk production. It is here to stay and its use has long ago passed out of the realm of doubt into that of certainty. It may be abused, or ignorance may oppose it, but its record is too long and too good to make it possible to exclude it from the company of the needed aids to the successful dairymen. One good rotation for dairymen in southern Michigan is corn, wheat, clover. This rotation economizes human labor by requiring but once plowing in four years and by making the cultivation of the corn serve the double purpose of retaining moisture and preparing the ground for wheat. It economizes fertility by giving two feeding crops to one selling one and at the same time providing plenty of bedding. It also fits into the regular work by furnishing the best possible place for the application of the stable manure. This material should be handled as little as possible. It supplies to crops not alone plant food but humus, not alone something to eat but something to drink as well, by making the soil spongy and retentive of moisture. Well rotted manure is not, therefore, what is so much wanted as the raw article, fresh from the stable.

Manure cellars are good things for large herds perhaps, but let us not forget in considering them that when it comes to exercise, cows are far better off in pure air outside of buildings altogether, except in the very coldest days of winter and that the temperature of the stable ought not to be kept so high as to make such exercise bad for the cows. Remember, too, that it is always better to haul the manure directly from the stable to the field whenever possible, to save labor and to save loss of fertilizing power.

All this is preliminary to a couple of points I wish to make and which I believe to be important.

Good butter has been high and scarce for many months. Even poor butter has brought a higher price than usual. The hybrid, illegitimate nondescript called renovated butter has been called upon to do duty as a recognized member of the dairy family and its makers have become rich because of the scarcity of good butter. I have no sympathy with those dairymen that are constantly fighting the butter renovator. His business is legitimate and I presume that most of his

product is wholesome. He sells it for a couple of cents a pound, perhaps four cents a pound, more than the groceries receive for the material which they furnish him. Then the grocery made a half cent a pound over the price paid the farmer. The wealth of the butter renovator then represents the accumulated profits of the product of a host of farms. Did you ever stop to think who the members of this host are? If you have you can foresee the point I want to make.

One of the worst enemies with which the dairy industry in Michigan has to contend is the man with one or two cows. Because of the bulk of the butter made in Michigan, fully three-quarters of it is made upon the farm and not in the creamery, I am compelled to emphasize the fact that the owners of these two-cow dairies are the men who give a black eye to the reputation of Michigan butter and they are the ones which make possible so many renovating factories. One of the economies which this convention ought to consider is the elimination of these small dairies and the substitution of herds that number not less than ten cows. I need not argue in this presence in favor of the creamery as against the home dairy, as that question is not directly involved; but I must argue in favor of the idea of doing dairy business on business principles, either on a scale which makes financial success possible or not at all. I believe it to be clearly demonstrable that no farmer can make expenses with two cows where the butter is made at home if he reckons the health, strength and work of the women of his family as worth anything. What we need is fewer herds and more cows. Then we shall have silos and all modern conveniences; then we can discover dairy economy.

The next point to be noticed is one relating to the supply of milk to our city. The city man and woman, as well as the city boy and girl, recognize milk as a most excellent food and find it an indispensable element in the daily ration. Of late they have been taught to regard the milk as sold from the wagons of the peddlers as a nasty solution of barnyard compounds and withal a veritable Pandora's box, dumping diseases of all descriptions into the family. As a result the per capita consumption of milk is decreasing in all our cities, a fact that works to the injury of the consumer as well as the producer.

Nor is the evil easy to remedy. In the first place, the complaint is in part well founded. Milk producers are proverbially filthy. They will not use stalls that compel the cows to keep clean; they will not properly clean the udders and moisten them; they will not strain the milk in a clean place through cloth and will not properly care for the milk, once produced. They neglect to feed after milking and often clean out the stables just before milking. In either case having the stable full of vile smells when the milk is passing through the air in fine streams. The consumer is learning about these things much faster than the producer is learning to correct the evils. To produce clean milk a man must have clean cows, milked in a cleanly manner in a pure air into clean pails and the milk at once removed and aerated and cooled in a clean room where the air is fresh and pure.

I have said that the consumer learns about the filthy milk faster

than the producer learns how to keep the milk clean. On the other hand the consumer offers little or no incentive to produce superior milk. His cry is all for cheapness. The man that supplies the most milk for five cents is the man he is seeking, not the one who will produce the purest milk. The producer, therefore, has little to induce him to take extra pains with his cows and stable. It is safe to say, as a business proposition, that the cities are getting as pure milk as they are willing to pay for, but I believe that the dairymen must take the initiative if they want to increase their business and must produce a clean milk and work up a sale for it at an increased price.

In the same way our creameries should be more fastidious in this matter. They should reject all milk contaminated with filth, the stables of the patrons should be frequently inspected and milk rejected where the surroundings make purity impossible.

Since tuberculosis may be conveyed to human beings from cows through the milk it is good economy to use the tuberculin test, ruthlessly destroying all animals which react, to the end that we may give a clean bill of health to the milk which the herd sends out. This is a matter of economy, of business.

In conclusion let me say that not only is milk produced more economically in the large herd but wholesome and clean milk is more easily produced there. After all, the fundamental evil that I am fighting is the scattering of our cows into bunches of one, two or three. My hope is that Michigan will become more and more a dairy State, that she will have more cows, and above all that these cows will be segregated into larger herds. I believe that when this time comes we shall have less complaint concerning the quality of milk, less renovated butter made, less credit given at the grocery store, more cash paid on cash deals, less hard work in the home, more time for fun and better times generally.

COMMERCIAL FEEDING STUFFS AND THEIR VALUE.

BY PROF. F. W. ROBISON, AGRICULTURAL COLLEGE.

There is no study, I feel safe in saying, that is of more economic value to the dairymen and stockmen than that of the commercial feeding stuffs. In this age of commercialisms and of the utilization of by-products, the feeder is compelled to use the greatest care and to exercise the greatest economy in the purchase of feed stuffs in order that he may compete successfully in the production of meat and milk. Engineers have recognized for some time that the speed of an engine depends on the character of the fuel supplied to it and successful dairymen and feeders now know that the quality and character of a feed is an exceedingly vital point in the economical handling of the dairy cow and other domestic animals. Corn fodder contains, in a general way, nearly as much nutriment as does corn and oats, but every feeder knows that corn fodder can never be made to take the

place of corn and oats. It is the quality of the feed that counts. Every dairyman knows that to get the greatest economical results from his herd requires a more or less constant definite proportion of the different nutrients in a feed. For example, to his ration consisting of corn stalks and hay he adds bran in order that the excessive amounts of carbohydrates (starchy material) in the fodders will be neutralized by the protein of the bran. In this way he gets a balanced ration but while it is impossible to establish an exact ratio of the compounds in relation to the carbohydrates and fat yet there is a more or less fixed proportion of the materials that it is decidedly economical to maintain in the ration.

There are few feeders and dairymen who, in order to establish a more or less balanced ration, do not buy some of the so-called commercial feeding stuffs and they buy these materials in order to supply an ingredient not furnished by the feeds they grow. This ingredient is protein. Numerous experiments have demonstrated and feeders will recognize that dairy cows and fattening stock require considerable protein in their daily feed—more than is found present in the hay, corn stalks, straw, etc., usually found on the Michigan farms. The feeder goes into the market and purchases commercial feeding stuffs to supply this lack of protein. He does not buy foods containing a large excess of fats, starches and fibre because the grains and roughages on his own farm supply sufficiency of these materials. But he does buy protein because that is what his home-grown feeds lack and what his stock demand.

Now it certainly makes a great difference to him whether he gets feed containing what he expects it to contain. It assuredly makes a difference to him if, when buying a feed supposed to contain twenty per cent. of portein it, on analysis, shows but five per cent. The feeder has been defrauded because he has paid for an article of high value and received something practically valueless. His stock have been defrauded because they have been compelled to eat an excessive amount of roughage to get the necessary nourishment for their sustenance. The fraud may not show in the feed to the naked eye but it is bound to show in the milk pail or on the block.

Michigan is becoming each year more of a stock and dairy State and it is well located in this respect, with easy access to the large city markets. The amounts of commercial feed stuffs, mill products and by-products sold is becoming enormous. Our border states and states in the east have, by law, required the licensing of such mixed feeds and, in consequence, Michigan is becoming the dumping ground for these low grade materials which will not stand the test in other states. As a result, when the Michigan stockman goes into the market for a concentrated feed for his animals, he is obliged to take the sweepings of some oatmeal factory, consisting of finely ground oat-hulls, dust, etc., or some mixture containing excessive amounts of ground corn-cobs and materials masquerading as legitimate and valuable feeds. I say he is obliged to take these materials because he has no way of discriminating. The naked eye will not tell him and there is no responsible certificate on the bags that gives him a correct idea.

In December, 1902, a bulletin, No. 203, was published by this experiment station showing the analyses of a few of these feeds that we

happened to get hold of. Since then the field has broadened materially until now the number of feed stuffs on the market, of the nature before described, is greatly increased. Many of these feeds, besides being low in protein, and hence undesirable from this standpoint, have gone to the exact opposite extreme and put in an exceedingly large amount of crude fibre-material practically useless as far as the nutritive effect is concerned and besides being always abundantly supplied in the roughage on the farm. This is distinctly a fraud and such feeds should be driven from the market. This station has definitely proven that the fertilizer law protects the user of fertilizers, for farmers can depend upon it that fertilizers bearing the State license are what the guaranty on the sack shows them to be. No one will dispute the good done in this manner, but how much more essential is it that what the domestic animals eat should be protected in the same way.

There is another point against which we are helpless under the present conditions and that is the utter lack of relation between the value of the feed and the price asked. Some feeds which contain practically nothing but oat-hulls, and worth no more per ton than sawdust, are sold alongside of such excellent feed as bran. There are feeds containing a fair percentage of protein sold for a much higher figure than their value warrants. There is in the Michigan market today an entire lack of any economic relation between the value of the feeds bought and the price paid for the same.

I desire to call your attention to the following table which will give you an idea of a few feeds which nicely illustrate the points we have attempted to discuss.

Name.	Protein. Per cent.	Fat. Per cent.	Crude fibre. Per cent.	Cost per ton.
Oats	11.80	5.00	9.50	
Corn	10.40	5.00	1.90	
Wheat	11.90	2.00	1.80	
Oat Hulls	3.30	1.00	29.70	
Corn Cobs	2.40	0.50	30.10	
Bran	16.00	4.25	8.00	
Jersey Mixed Feed	12.81	3.65	15.01	$21 00
Dairy Winter Feed	14.75	4.09	12.17	23 00
Winter Mixed Feed	13.12	3.17	15.90	22 00
Royal Oat Feed	4.82	2.75	25.40	17 50
Victor C. and O. Feed	8.49	3.30	13.40	21 00
Gluten Feed	25.01	8.73	7.00	
Gluten Meal	34.49	2.40	3.00	
Cotton Seed Meal	43.70	9.48	8.40	
Cotton Seed Hulls	4.20	2.20	46.30	

As a grain feed for dairy cows there are very few that will take the place of wheat-bran and on the basis of bran let us consider briefly the cost of protein in a few of the other feeds.

Let us first take "No. 8, Dairy Winter Feed," it being the best of the five mixed feeds shown in the table. Now if bran with sixteen per cent. protein costs $19 per ton—100 pounds of protein in bran will cost $5.93, while 100 pounds of protein in Dairy Winter Feed will cost at $23.00 per ton, $7.79, or in other words, $1.86 more than in bran,

and then, besides all this, the feeder in order to give his animals the 14.75 per cent. protein that it carries, must also give them at the same time four per cent. more crude fibre.

Should we go to the other extreme and compare the protein in Royal Oat Feed, the comparison will be little short of laughable. In this feed 100 pounds protein costs over $18.00, or over three times as much as the protein in bran and then besides the animal must sort over about 1,500 pounds of oat hulls in every ton to get the little protein they contain. It makes a difference whether you take the protein from a feed containing a high percentage of fibre or from one containing but a moderate amount. You may argue that the animal's time is of little significance but when we fully realize that to masticate the food and prepare it for solution in the digestive apparatus of the animal requires the consumption of flesh already on the body then perhaps we will cease to use these foods that cause the cow to thus chew her cud through all eternity. These foods should all be marked so the farmer and feeder may know what he is getting and figure what ones are economical for him to buy. It is the earnest hope of this Station that the time is not far distant when it will be as difficult to sell an unbranded feed as it now is to sell an unbranded fertilizer.

W. F. Raven, of Jackson, led in the discussion of the paper of Professor Robison.

He favored the idea of the enactment of a law requiring the analysis of commercial feeding stuffs and the branding of each package with a guaranteed analysis, and urged that a resolution be adopted by the Round-Up Institute favoring such an enactment.

DAIRYING IN FRANCE.

BY MAJOR HENRY E. ALVORD, WASHINGTON, D. C.

The afternoon session was closed with a lecture by Major Alvord illustrated with a stereopticon. A large number of views showing the methods used in Normandy and Brittany and other sections of France were shown. Among others there were several views of French farm buildings. These are arranged in the form of a quadrangle about the farmyard, the house being upon one side and the stables and other outbuildings completing the square. The entrance to the farm yard is through a gate that is in one side of the yard. Other pictures showed the interior of the dairy rooms. Some of them showed the dairies of the past centuries with a very crude equipment, although a barrel churn was noticed in one of them. The French were among the first to market milk in bottles and the form first used was shown. The packages used for butter in France are small baskets in which the rolls of butter wrapped in clean straw are packed. An auction butter market in Paris was also illustrated. The customers stand on either side of a long plank along which the butter is passed and sold at auction.

GOOD ROADS.

Wednesday Evening.

It was expected that Hon. W. H. Wallace, of Bay Port, would act as chairman of this session, but he was unable to be present and Hon. A. M. Brown, Secretary of the State Board of Agriculture, was requested to act in his place.

Music for this session was furnished by the M. A. C. orchestra, which gave several selections previous to the opening of the exercises, and by the M. A. C. Glee Club and Choir, which furnished songs during the evening. The recitation by A. J. Anderson, of the College, was well rendered and received an encore.

In his introductory remarks, Secretary Brown referred to the importance of greater attention being paid to the construction of permanent highways, and referred to the military roads of the old Romans, which, after 2,000 years are in many cases in excellent repair. He then called for the first topic upon the evening program.

MICHIGAN HIGHWAYS AND HOW TO IMPROVE THEM.

BY HON. A. E. PALMER, KALKASKA.

From the earliest settlement of this State, the common wagon roads have been of greater importance to its people than any other form of internal improvement. They were of absolute necessity to the early pioneer and are of equal value to the twentieth century farmer. No substitute has ever been found nor will the use of them ever be less. A net work of railroads has been built to answer the demands of transportation and commerce, electric roads are being pushed to the very boundaries of the State, to satisfy the call for rapid and cheaper travel, but all these later improvements only intensify the necessity for more permanent and better highways. The development of Michigan from the unbroken wilderness to a most prosperous agricultural and manufacturing State has been very rapid—all within the memory of many men still living,—but the conditions of our roads are not on a par with farm development, in fact under present methods they never can be.

We are well aware that there are many localities in the State, where under the inspiration of a high grade of enterprising citizen-

ship and under favorable conditions, fairly good roads are found, but speaking in a general way, I am not disposed to be enthusiastic over the quality of the average wagon roads as we find them, and because of the general interest shown by our citizens in any discussion of better roads, I think it is fair to presume that the present conditions are far from being satisfactory.

I would not belittle the efforts made for half a century or more to construct a system of wagon roads through the State. The people in the matter of taxation have been liberal to a fault; it has not failed of success through any want of money or labor,—rather through the misapplication of this same labor and funds.

The law under which the early roads were constructed was unquestionably applicable to the then present conditions, but that it is equally practical now does not follow any more than that the practice in farm and orchard work of that early date would answer the demand of these later years.

Do not expect any very radical change for the better as long as the present highway labor law remains in force upon our statutes; with the many optional provisions it is but a patchwork system at the best and fails to give us result. It fails in that it does not provide a uniform system of road construction; no fixed plans or specifications have ever been adopted, and had there been, it would be practically impossible to enforce them because of the small unit of management, the lack of taxable area and the diversity of conditions. As it is, a great part of the annual expenditures are practically wasted, except perhaps to keep the roads in passable repair for present use. There are many reasons why this is so,—as many perhaps chargeable to the system as to the immediate supervision,—notably the fact that the original highway laws held out an inducement to lay out and construct roads along lines of naturally easy grades, economical construction and small cost of maintenance. No greater mistake was ever made than that section lines were laid out on the most desirable lines of road construction; hills, swamps and undesirable bridge crossings were all ignored in the interest of air line roads.

Very often the cost of construction of such roads has exceeded the entire original value of adjacent lands, when a slight curve of the roads, or change of location, would not only have saved the larger part of the original cost, but would have furnished to the traveling public these many years an easier and much cheaper route and, further, the first cost of such a road is a very small item as compared with the never ending cost of maintenance. Because of this faulty method of laying out and poor construction, we are annually wasting tens of thousands of dollars simply to preserve the entity of and keep in repair these roads which can never be made permanent, except at an excessive expense not likely to be incurred.

Our present laws provide that after a road has been in use ten years all labor or money thereafter expended upon such highway shall be laid out with a view to permanent construction, but how to do it the law is silent. With thousands of road builders and no source of instruction whatever, in matters of methods and forms best suited to the varying conditions of soils, surface water, grades and the demands of travel, with the inadequate supply of labor and want of engineering ability,

what better results can be reasonably expected? Such a law is a dead letter as it applies to the State as a whole.

Road building and road repairing is a work that requires special knowledge of methods and materials, expert ability to handle machinery, and depends not so much upon an increased amount of expenditure, as upon a better use of the large sums already annually provided under our present system. These problems must be solved in every road district, antagonized by the seeming selfish action of local authorities and the lack of interest and co-operation as to any definite policy to be pursued.

Time will not permit me to go into details, but I want to call your attention to one feature of road building in which many costly mistakes are being made. The best road construction will deteriorate from the action of natural elements and the wear of constant travel and no part of a road is as important as the foundation. The lack of drainage is responsible for most of our poor roads and is most destructive to many of our otherwise well-built roadways. Many of our roads are so constructed as to be fitted for use only in dry weather, many of our best gravel roads are but temporary because of the lack of side or underdrainage, a great loss of material and labor because of the lack of a little forethought in preparing the foundation. In a little time the gravel will have disappeared and the original conditions exist. Had the foundation been dry, the action of the water and frost would have been prevented and the quality of the road been preserved and permanent throughout the entire year.

To recapitulate, the time will come when through the efforts of the so-called good roads crank, our citizens will unite in so changing our system of road building that all highway taxes will be paid in cash; when the unit of control will be enlarged from the district to that of the township and county; when many now optional laws will become mandatory,—at least as to some limited amount of permanent construction; when road officers will be selected because of their ability and will receive such remuneration as will secure their best efforts; when the State will undertake to furnish all necessary information as to road building, and such engineering skill as may be required by the various townships and counties, together with plans and specifications suited to individual localities; when the townships counties and State, each contributing its share, will unite in a uniform method of construction, thus securing a permanency of condition and less waste of public moneys, with much more satisfactory results.

TOWNSHIP, STATE AND NATIONAL CO-OPERATION IN HIGHWAY BUILDING.

BY HON. HORATIO S. EARLE, DETROIT, STATE HIGHWAY COMMISSIONER.

It is my purpose to prove to you that it is necessary, wise and equitable and constitutional for the National government to aid in improving the public wagon roads, and that it is necessary, wise and equitable for the State to do the same, and that our constitution should be changed so as to permit it.

I advocate national, State and local co-operation in building better roads.

It is necessary because, if you do not have national and State aid, the road must be poor in a poor township, while it may be good in a rich one; but continuous good roads are so valuable that it is wise to aid in order to make them possible.

We have the best waterway and railway systems of any civilized country on earth. Why? Because we have expended $451,000,000 in improvement of the waterways, and in capital and interest $138,000,000 in aid of the railways, and in addition have given to encourage railroad building 196,000,000 acres of the public lands, or a grand total of $1,450,000,000. This has been wise legislation, too, for it has made it possible to put wheat from Chicago into Liverpool for six and one-half cents per bushel where it cost fifty years ago fifty cents per bushel to ship it from Chicago to Boston; further, wise because by building or aiding in the building of the railways the great states of the Northwest have been made tributary to all the world, so low is the cost of transportation.

To our shame, however, we have the poorest common wagon roads of any civilized country on earth; but every country that has better roads than we have got them by national aid, and we cannot get them in any other way, for they cost too much to build for localities with a small assessed valuation to raise the money. No need for us to sit around and wish that good roads would grow, for they won't, you have got to plant the seed,—brains and money—in order to get a crop of good roads in this country the same as they have in the other civilized countries.

We are stockholders in three corporations, (1) in some township, village or city corporation, (2) in the Michigan Co-operative Company, (3) in the United States Federal Company.

In the first kind, the township board, or the village or city council are our directors; in the second, the State senators and representatives are our directors; in the third the U. S. senators and representatives are our directors. They are elected by us to carry out our will and to draw a salary for doing that, and they are perfectly willing to do it, but we must arouse a sentiment universal before they will act.

We have given to the United States Federal Company the right to put a tax on the manufacture and sale of tobacco, cigars, cigarettes and intoxicating liquors.

I do not pose as a minister of the gospel or a confirmed drunkard,—I am somewhere between the two,—and so far as this argument goes it is not necessary for you to guess just where between the two I am at, for I am not here to discuss the question of the wisdom of drinking or letting it alone. Emerson said, "It is impossible to tell a man what he does not know, but possible to call his attention to things he does."

Well, I purpose to call your attention to the things you know. First, you know of the internal revenue tax; second, you know that in the year 1900 Michigan paid $54,000,000 of internal revenue; third, that this money went to Washington; fourth, that the excessive use of intoxicating liquors creates a lot of unfortunates; fifth, that instead of sending these to Washington to be taken care of by the money raised by taxing that business, you put them into your State institutions which you tax yourselves to build and tax yourselves to run; sixth, I believe that it is equitable for you to ask for some of this money to be sent out into the rural districts to improve the common wagon roads, which will eliminate a portion of the first cost of transportation, which will make it easier for you to pay your taxes to support the crop of unfortunates created by a business that you are not engaged in and which pays no profit to you.

And I believe it is as constitutional as it is to improve waterways and aid railways, and I cannot see any difference between one kind of transportation way and another so far as the constitutionality is concerned.

I do not think this any time or place to discuss matters over which there is a difference of opinion in political parties, and I am going to guard myself so well, that you cannot tell from anything that I say whether I am a republican, democrat, prohibitionist or a middle-of-the-roadist; I am not going to speak of the merits or demerits of the protective tariff, but we have one and you know it, you also know that the friends of a protective tariff say, that it generates industries and enhances the wages of employes; you also know that its enemies say that it generates trusts and combines, which water their stock and put up the prices on necessaries in order to pay dividends on their watered stocks. Be this as it may, trust and combines are industries and, which ever way you look at it, whether with democratic eyes or republican, you see that they have been benefited.

Where are these industries situated,—in a village or city which are both situated alongside of either a waterway or railway, and many times by both, both of which have been aided by the government, and the properties of these industries as well as a large portion of the property of the waterways and railways are also situated in these villages and cities; then the government has, by aiding the industries by a protective tariff and by aiding the waterways and railways that also aid the industries, which are largely taxed in the villages and cities, indirectly but surely aided in the paving of the village and city streets.

If "Do unto others as you would that others should do unto you," or reciprocity between countries is wise, it seems to me it might be a good plan to use it nearer home, and try it by actually giving some of this money collected on imports to build better roads out past the

greatest industry in the world, and the one which must prosper or all other industries fail—the farming industry,—so that it may receive a generating impetus, and by so doing you will reduce the first cost of transportation to the benefit of the farmers and also make it easier to get to school, to church, to grange and club halls, and neighbors' sitting rooms and dinner tables and in this way generate better girls and boys, and so a better United States of America.

Now as regards State aid—is there any equity in it? Let me call your attention to something in which there is no equity; however, let me again say, that I am not here to discuss religious or moral questions. I am not like the hen that was given forty-eight eggs to hatch, and she being an energetic hen spread out over the whole forty-eight and that made her so thin that she didn't hatch a single egg; now I am trying to hatch but one and that is the good roads egg; but I can see without much trying that there are four thousand saloons where intoxicating liquors are sold in this State; also see that the license money is divided between the city, or village, and the county; I read the other day in that religious journal called the "New York World," that one-half the insanity in men was caused by the excessive use of intoxicating liquors and that half of the insanity in females was traceable to the same cause; so I think I have a right to use just a bit of common horse sense and come to this conclusion, that one-half of the criminals, one-half of the insane and one-half of the feeble-minded are created by the excessive use of intoxicants. Well! Your farmers are not in the saloon business, neither are your farms situated in the village or city; but these unfortunates are created in the village or city and after they are created they are sent to the prisons, reformatories, asylums, or home for feeble-minded, which you taxed your farms to build, and tax your farms to run, and I would ask, that the license money be divided into three equal parts, one-third to the village or city, to pay the policemen to watch me when I am drunk, one-third to the county to pay for my keep if I go to the county house after squandering my money, and one-third to the State treasury to pay my expenses if my drinking makes a criminal out of me, or to pay the expenses of my wife if my debauchery drives her to the insane asylum, or to pay the expenses of taking care of my foolish children if foolish they may be, or I would ask if my farm has got to be taxed to take care of unfortunates created in village and city in which I have no hand and do not participate in the profits; I insist that it is but the golden rule doctrine or reciprocity that all property in the State pay something toward the improvement of the common wagon roads.

Never in my life did I have a better illustration of my duty than a few days ago regarding paying something on my property in the city of Detroit, toward a State aid fund for improving roads; I was at Brown City—spoke there to a large audience at a Farmers' Institute; it was on Saturday and I wanted to get home that night, but there was no railroad train that I could get that would take me there, so I engaged a livery rig which took me to North Branch where I could get a train. Now if there had been a train and I had gone to the station in Brown City and purchased a ticket, what would have happened? The ticket agent would have charged me a sufficient amount of money to have paid a fair dividend on the money invested in the railroad

business to the extent of the individual transaction of carrying me, he would also have charged me enough to have paid for the operation of the railroad so far as this transaction was to be considered and also enough to pay the taxes of the railroad company for that fraction that this transaction was to the whole business of that company in the State in a year.

But as I could not get a train, I hired a rig and the owner of the livery stable charged me enough to pay a dividend on the money invested in the livery business, enough to pay for the employes and enough to pay his taxes in Brown City, that is that fraction of them that this individual transaction was of his whole business; this included school tax, his county tax, and his paving tax; and then this livery man and I, the unconstitutional state highway commissioner, had the consummate gall to ride to North Branch over twelve miles of road built by the farmers and kept in repair by the farmers and to which he or I had never contributed the first red cent.

Now I would be glad to pay a good road tax of twenty-five cents on a thousand. This would cost me on the house I live in the same amount as it costs me to take my wife to Barnum's circus—one dollar a year, and it wouldn't bankrupt me; this would raise the State something over $400,000 a year; about sixty per cent. of this would be raised on village and city property and the balance upon farm property; the money would all be expended in improving the roads in the country; the money as well as the road would be left in the country, for the labor would be hired there; this would have a tendency to stop the country boys from flocking to the city and when the roads became good would allow the village and city people to ride and enjoy the country scenery and get the pure ozone.

There are some who contend that as the village and city pave their own streets and permit the farmer to use them, that he ought to build and improve his own roads; if they were for him exclusively, I have no doubt but what he would be willing to, but the roads are for all and all should contribute; when the farmer uses the village or city street it is for the purpose of selling his load on which the village or city buyer sets a price as will permit of his paying his paving taxes, and when that farmer gets his money for that load, he buys another load or part of a load to haul home and on this load the village or city seller has set a price and he has put his paving taxes into this also, and when he retains the lawyer or settles with the doctor, they put in a paving charge and they never forget to make it large enough; even when he goes to the hotel and eats the musk-melons that he sold for fifty cents a dozen they put in a paving tax and charge him fifteen cents for a half of one.

However, I have no complaint to make for I am a manufacturer and when I sell the former something that I have made, I put in a paving tax and a good one, too, but I am willing to give a little back and believe that when state aid, and national aid is adopted and I surely believe it is going to be, it will not only develop the rural district to the benefit of the farmers, but I believe in that development all classes will be benefited more than they could be by an equal expenditure, in any other way, of a like amount of money.

THE IDEAL HIGHWAY SYSTEM.

BY HON. JOHN HAMILTON, FARMERS' INSTITUTE SPECIALIST, U. S. DEPARTMENT OF AGRICULTURE.

Mr. President, Ladies and Gentlemen:—The "Ideal Highway System" can have but one purpose, and that is to provide for the construction of ideal highways. In endeavoring to discover the requisites of a system that is to insure the construction of good roads, there is need first of all that we should have a clear conception of what constitutes an ideal highway. After this has been agreed upon, we will then be in position to take up the points that seem to be necessary in order to secure the kind of road that we wish to construct.

The ideal highway has four prominent characteristics. The first is that it must be "dry." It must be dry at all seasons of the year. Many who had charge of the construction of our public highways do not seem to understand the importance of this simple requirement, for it is no uncommon thing to see roads that seem to have been formed for the purpose of holding water rather than shedding it, and frequently it occurs that when neighboring springs have dried up and other sources of water supply have failed, there can always be found an abundance in the mud holes that have been formed in the middle of our public roads. An ideal road is never wet. Even in wet weather a properly constructed road will get rid of all the surplus water, and a moderate wind for a few hours will make it dry and comfortable for travel. Whatever means are necessary, therefore, to secure this quality must be used or the road can never be placed in the grade that we call, ideal.

The second characteristic of a good road is that it is "solid." This can be secured in many instances by proper attention to the first requirement that has just been mentioned—proper drainage. A dry road, if it is not sandy, is usually a solid road. In order that the part of the highway that is used for travel may be kept in good condition, it has been found in the end to be cheapest and most satisfactory to have the surface made of some material that will withstand the abrasion occasioned by the feet of horses and the wheels of wagons. Stone ballast is the material that commonly is found to be the cheapest for securing a solid surface. The character of rock to be used for the wearing surface is largely determined by the cost of transportation. Trap rock it is generally agreed stands at the head of the list of surfacing material. Limestone having a considerable admixture of magnesia is perhaps second best. Vitrified brick have been found to be highly satisfactory when properly laid, and the expense in localities where trap rock and limestone are difficult to secure, and suitable material for brick can be had nearby, is not much greater than these other kinds of material.

Eighty per cent. of the public roads of the country will accommodate public travel very satisfactorily if they have a ballasted surface eight feet wide, or have provision for a single track. Fifteen per cent. of the roads will be entirely satisfactory with a ballasted track twelve feet wide, and the constantly traveled roads near cities and large towns where

many teams pass to and fro heavily laden, will accommodate the travel if the ballasted section is sixteen feet wide. There is no necessity for roads to be ballasted twenty and twenty-four feet, outside of city streets. It is useless expenditure of public money, altogether unnecessary, and not required for the accommodation of the traveling public. An eight-foot road, ballasted six inches with finely crushed stone, all of which will pass through a one and one-half inch ring, can be constructed where the stones are easily accessible, for about $500 a mile. This will not be an ideal road, but it will be far superior to the roads that commonly exist, and will serve the public about as well as if the construction cost from $1,500 to $2,000 per mile. A good road, therefore, must be solid at all seasons of the year. The most economical method of securing this must be determined by the circumstances that exist in each individual locality.

The third essential feature of an ideal road is that it shall be of "easy grade." A single elevation of twenty per cent. grade, on a road otherwise satisfactory, is fatal. The number of pounds that a team can haul is determined by the steepest hill over which the load must pass. Hundreds of dollars have frequently been spent in the effort to make an unusual grade passable when a slight change in the location of the road would have given a satisfactory solution to the problem at scarcely any cost. I have in mind three localities in my home township in which the public roads pass over the points of hills requiring grades that are greatly in excess of any other in the entire distance that the roads traverse. These roads were laid out by a commission appointed by the Court, presumably chosen because of their superior qualifications in the matter of locating public roads. One of each commission was a civil engineer, and yet if you had taken a boy of twelve years of age and had placed him upon the highest point where any one of these roads cross the hill, and asked him to indicate where the road ought to go, would instantly have pointed out a level route around the hill. The road was placed in the location it occupies by reason of the fact that the line between properties passed over the points of these respective hills and the owners would not permit the road to encroach upon their properties so as to cut off a fraction from the main body of their farms. It would have been far cheaper for the township authorities to have purchased the entire acreage cut off, at the excessive price of $500 an acre, rather than to have permitted the road to have passed over these hills. The owners of these lands should have been given to understand by the road commission that this highway was being constructed not for their particular benefit, nor for that of the present generation alone, but for the thousands and tens of thousands of citizens who were to use it through all time to come. Easy grades are essential characteristics in any road that is worthy of being called ideal.

The fourth quality is that it shall be "smooth." It may be dry, it may be solid, it may be of easy grade, but it may be so intolerably rough as to be practicably impassable. If loose stones are in the way, or rocks project, or if the ballast has not been well prepared, or if the road-bed has been uneven in its construction, the road itself cannot be called ideal. Examples of roads of the character here described can be seen in many of the paved streets of our cities and larger towns where the foundations have given way, and the ballast or paving has sunk in places, making the street uneven and rendering it entirely unsuitable for public

use. A good road must be smooth, and possess the other qualities that have just been described—be dry, solid, and of easy grade.

An "ideal road law" must provide for and insure the construction of such roads. It must not leave the formation of the road to the judgment of the individual or locality that has the construction in charge. The law must insist that the road shall be of the character described, and supervisors, or road constructors, must conform to the requirements of the law no matter what their private views as to road improvement may have been.

The first great requirement in an ideal law for the construction of the ideal road is that it shall provide for the *proper "locating of the road."* An improper location makes it practically impossible by any after methods that may be used to form it into an ideal road. I have already indicated in what respects location can destroy an otherwise well constructed highway. Grades too steep for loaded teams, and foundations too soft to bear up the surface ballast.

The ideal road law must also provide for *"competent supervision."* In many States the management of the township roads is in the hands of a board of citizens who are elected from year to year, and are known by the name of road supervisors. Most of these men never had any experience in the construction of public roads other than that which they have gained by observation in the community in which they live. In many instances they are either superannuated or are elected to this position because the small amount of compensation which the office affords will take the place of public charity. There is no serious effort made to select men who will construct roads that will serve the public for years to come with comparatively slight repair, but the public funds are entrusted to men of little or no business ability, and are used for improvements of the most temporary character, generally of such a kind as will be utterly destroyed before the beginning of the coming year.

The boards of supervision under an ideal system should be composed of the most capable citizens that each community contains, business men, professional men, busy men. The system should make but one requirement upon this board and that is that it should be intelligent, and bring to the matter of road construction and road improvement the same qualities that are necessary in order to succeed in other kinds of business. Instead of being required to be present personally when roads are being repaired, and thus make it impossible for a business man to serve, the board of supervisors should merely indicate the character of of the construction, and leave the details of carrying into effect their plans, to a subordinate employed for that specific purpose. In other words, they should have a foreman to whom they commit the carrying out of the work that they have planned. Competent supervision is of first importance in any kind of business whether it be railroad management, the control of a mill, or mine, or manufacturing establishment. Road construction is no exception to this rule, and any system that fails to provide for competent supervision cannot be called ideal.

An ideal system must also provide *"some money"* for road construction. The phrase "working out the road tax" by the citizens of the community is a misnomer. Loafing out the tax is nearer the truth, and the system that permits men to loaf out their tax is seriously defective. Road construction should be upon business principles, and men who

appear for service in this construction should be required to give a dollar's worth of work for a dollar's worth of credit on their taxes. But no matter how efficient these workers may prove to be, some money is necessary outside of the labor which they perform. Bridges are to be constructed, machinery must be purchased, extra labor must be had at times when the citizens are unable, by reason of their occupation as farmers, to work upon the public roads. Some of this money should be furnished by the community itself.

To relieve citizens from all responsibility for road improvement would be a serious mistake. Some taxes, to be paid in money, should be levied upon every community. About fifty per cent. in money, and fifty per cent. in work would be a fair proportion if the system is so constructed as to compel those who present themselves as workers to render satisfactory service.

Every road, no matter how well constructed, requires continual care, and the fourth quality in an ideal road law is that it shall provide that every mile of road in the entire State shall be under the constant attention and care of "a competent custodian." Roads lie out of doors; are subject not simply to wear by travel, but also to the effects of heat, and frost, and floods. Summer and winter, day and night, year in and year out, these elements are at work and more destruction is occasioned through their influence than by all the travel that passes over their surface. The practice of repairing roads for a week or two in the spring and a week or two in the fall of the year, and then allowing them to lie uncared for during the intervening periods, prevails throughout the United States. No railroad corporation could run its trains for a single month if the track hands were to be dismissed in May and no work were done until September. The ideal highway has some one in charge and responsible for the roads every day in the year.

I had charge of the public roads in my township for several years. It was impossible for me to give personal attention to the details of the work of their construction and maintenance. I placed in charge of twenty-four miles of road two men who were given each one-half of this district, or twelve miles apiece. These men were instructed to be out upon the roads every day and were given special instruction to be out during the days in which it rained. They were given gum coats, gum boots, and a gum hat to protect them from the weather and were required to stay out all day during the time that the rain was falling, turning the water off on the hills, protecting the bridges, seeing that the work that had been done in dry weather was not destroyed during the wet season. Roads do not run away in dry days. They leave us during the showers and heavy rains. The necessity for a custodian is not so great during the sunshiny days of summer, but upon every rainy day there is necessity that every mile of road should be patrolled by some one who is responsible for keeping them in repair. One man can often do more in one wet day to save the township from loss than could be repaired by twenty men in ten dry days. The radical defect in our present road system is that there is no custodian in charge of our public roads during the entire year. A road law that is to save the public money must insist that the roads shall be kept in proper condition for travel at all seasons, and that the work that is done on them today, shall not be allowed to be destroyed tomorrow.

An ideal road law should provide, in addition to the items already

mentioned, for "State aid." By State aid is meant the contributing by the State to the country districts for road construction, of money which was not received from taxes imposed upon country people, but from revenues derived from money interests, from franchises of corporations, from license fees, and the various other sources of income outside of agriculture that contribute to the expense of the State government.

In the earlier periods of our history almost all of the inhabitants resided in the country. So long as this condition of society continued it was entirely equitable that the roads should be maintained by country people. In these later years population has largely drifted to the cities. Great corporations have come into existence, and many other large interests have become a part of our State and National systems. Instead of the roads through the country districts being, as formerly, for the special and exclusive use and occupation of country people, they are now an essential and integral part of our whole business organization. They have become the feeders of the great transportation lines. The great industrial centers use them in the distribution of their manufactured and imported products, so that cities, corporations, and all of the important business interests outside of agriculture are directly concerned in the improvement of the condition of the public highways and equally interested with those who live in the country districts in having easy, direct, and rapid communication with all parts of the State. It is clear also that the kind of roads now needed to properly accommodate the traffic of the country are too expensive to be constructed by country people unassisted by the State. A portion of the expense, as I have indicated, ought to be borne by those in whose neighborhood the roads are located, but the amount that agriculture can contribute for this purpose without injury to this industry is not sufficient. The other business interests of the country should share the expenses of providing proper transportation facilities for the distribution of their products, and the State by taking a portion of the money which these interests contributed for public purposes and devoting it to road improvement in the country districts, is making proper expenditure of public funds and is recognizing a necessity in any road law that is to secure good roads within reasonable time.

The sixth feature in an ideal road system is a requirement that all vehicles using public roads and carrying loads in excess of 2,000 pounds, shall be provided with "tires at least four inches wide," and all vehicles using public roads and carrying loads in excess of 4,000 pounds, and not exceeding 6,000 pounds, shall be required to have tires at least six inches wide. To construct an expensive highway and then permit the users of the road to destroy it by the use of wheels whose tires resemble the discs that are used for breaking up our fields, is a criminal use of public property. It is the wanton destruction of that which the public has gone to great expense to secure. An ideal road-system should certainly protect the surface of the roads from being broken up by overloaded wagons, and provide severe penalties for the disregard of this requirement. The law should provide for *"wide tires."*

The seventh and last item that an ideal road system should contain is one which will provide for the "proper classification" of country roads upon the basis of their relative importance. Many roads, indeed

the majority of the country roads, are subject to but little travel. To expend for the improvement of such a road sums equal to that necessary upon the suburban highway where the traffic is very great, shows a want of discrimination and appreciation of the fitness of things that is inexcusable. I have indicated elsewhere that there are at least three kinds of roads classified according to the amount of travel for which they are expected to provide. The first-class being such roads as are near cities and large towns, that drain large areas, and into which there come the traffic and teams from many districts. The second class being such roads as are of considerable importance but do not have the amount of traffic that the first are required to bear, and the third class embracing all other roads, which comprise the great majority of the mileage in every state. These three classes should be treated separately and attention be carefully given to the traffic requirements of the districts through which they run preliminary to the expenditure of money in their permanent improvement.

The "ideal road," therefore, is dry, solid, of easy grade, and smooth, and the "ideal road law" must provide for the proper locating of the road; for competent supervision and for at least a portion of the tax being paid in cash. It must provide a custodian who will be on the roads every day in the year. It must provide for State aid; that wagons carrying loads over 2,000 pounds shall be provided with wide tires; and that the roads shall be classified according to the traffic needs of the several communities through which they run.

A road system that embodies the requirements that have been enumerated is not only an ideal system, but is within the reach of the present generation and can be put in practice in all of its details without injustice to any individual or corporate interest and to the great advantage of the entire population and business of the State.

FARM CROPS.

Thursday Forenoon.

The chairman of the session was N. A. Clapp of South Lyon, President of the State Association of Farmers' Clubs. The topics upon the program were "Corn and Its Products," by Professor J. A. Jeffery; "Sugar Beets," by L. W. Oviatt and H. B. Cannon, and "Cucumbers and How to Grow Them," by M. L. Dean, with discussions after each topic.

SOME PRODUCTS OF CORN.

BY PROF. J. A. JEFFERY, AGRICULTURAL COLLEGE.

In the short talk I shall give this morning I have two objects in mind:

1. To add something to your knowledge of the uses to which the corn crop is put, and

2. To bring to your minds in a concrete way one of the lessons the farmer may learn from the manufacturer—that of utilizing every resource, and utilizing it most completely.

We need not spend time to speak of the corn meal—the good old stand-by made from the crop from our own farm; and most of us are more or less acquainted with the hominies, fancy meals, and corn flour to be had on the markets. It is of less familiar products that I wish to speak.

Every one knows of corn starch, if from no other fact than the eating of corn starch pudding, and he knows that corn starch is a product of corn; but that it has other uses direct or indirect he may not be aware. He may know also that the kernel of corn contains other material than starch, but of their uses and economic or commercial value, he may know little. And so, first of all, let us turn our attention to the product resulting directly or indirectly through the manufacture of starch.

In this industry probably 40,000,000 bushels of dent corn of all colors are used annually.

If you will place a few kernels of corn in a cup, pour hot water over them and let stand for twenty minutes, you will find that with a sharp pointed pen-knife you can readily separate from these kernels (1) the hull or bran, (2) the germ or "chit," and that you will have left, (3) the kernel proper. In the first step in the manufacture of starch

this is practically what is done excepting that slightly acidulated water instead of hot water is used and that the separation is accomplished by means of machinery. The corn is cracked by rolls and the separation of hulls and germs from the portions of kernels proper is complete by stirring in tanks.

The hulls after separation are dried and are put upon the market as corn bran at from eight to ten dollars per ton to be used as stock feed.

CORN OIL.

The germs are also dried, then ground and placed under great pressure—forty thousand pounds per square inch. This removes 90 per cent. of the oil which they contain. The oil is run into tanks and after settling is barreled. Four million gallons of corn oil are exported annually to be used largely, we are told, in the manufacture of soap. Of that remaining at home a considerable amount is used in making paint. Another portion is, by some chemical process, converted into an artificial rubber—vulcanized corn oil it is called. This artificial rubber is mixed with true rubber to be made into bicycle tires, footwear, etc.

Corn oil is worth from 4c. to 5c. per pound—30c. to 40c. per gallon, wholesale. This is three or four times as much as can be gotten for cornstarch. It would seem, therefore, that if the farmer who supplies the corn to the starch factory could increase the oil content of his corn, it should be worth more to the manufacturer and that, therefore the farmer should receive a better price for it. A bushel of shelled corn yields about 1.8 pounds of oil.

The portion of the ground germs left after the oil is extracted is reground and sold as germ oil meal at something like $23 to $25 per ton for stock feed. It is considered a rich feed, having a high protein content.

The remaining portion of the kernel is now ground or crushed, and the starch washed out and dried. What remains of the kernel after this process, is known as gluten, which when dried, is put upon the market as gluten meal at something like $25 per ton. It is an excellent feed for milch cows and growing animals.

The greater part of the gluten meal, however, is mixed with corn bran in about the same proportions in which they are found in the corn, and ground together. The resulting product is known as gluten feed; it sells for something like $17 to $18 per ton, and I am told is in good demand, being highly esteemed in Michigan by dairymen.

Of the starch there are two general grades—laundry and cooking, but of brands there are several, depending on the use to which it is to be put and the condition in which it is desired by the consumer, whether pulverized, as grits, or otherwise. Dry starch is quoted as being worth from one to one and a half cents per pound wholesale.

One bushel of shelled corn (fifty-six pounds) produces about,

1.8 pounds corn oil,
2.7 pounds of germ oil meal,
36 pounds of dry starch,
7 pounds of gluten meal, and
5 pounds bran.

FIRST BABY FOODS.

Before baby foods came into fashion our mothers sometimes placed wheat flour in the oven and slightly browned it and from this material by adding hot water made a sort of porridge for the baby. When properly sweetened it was usually eaten with much relish by that individual. Indeed, the older ones of us enjoyed not a little eating what was left after the baby's hunger was satisfied.

We did not realize in those days that this act of our mothers of browning the flour was really a scientific thing to do. By this operation the starch of the flour was changed chemically and became dextrine which was more readily digestible than starch. Great quantities of starch are converted into dextrine at the present time. This is accomplished by heating the starch to 415 degrees or more F. I can not say how much of the dextrine is used in the manufacture of the baby foods and breakfast foods, or indeed whether any is used. Dextrine is used in the manufacture of mucilage and in the manufacture of a paste which is used in the printing of calicos, the object being to prevent the "running" of the colors.

A gum also is made which is known as "American gum" from which is manufactured the mucilage which we find on postage stamps, envelopes, paper wrappers, and the like.

Our texts in physiology teach us that all starchy foods especially, should be thoroughly chewed before swallowing, in order that the saliva acting upon the starch may convert it into sugar before it reaches the stomach. From the stomach this sugar is absorbed through the walls into the circulation and is ready for the use of the body. If the starch is not changed by properly mixing with the saliva before it reaches the stomach, it remains undigested and therefore unabsorbed until it passes from the stomach into the lower digestive tract.

ARTIFICIAL DIGESTION.

The manufacturer has learned to change the starch to sugar artificially. He accomplishes this result by treating the starch with dilute acid; the resulting sugar is known as glucose or grape sugar. Great quantities of starch are so treated. One large factory alone uses ten thousand bushels of corn daily and converts the whole starch product into glucose syrup. Glucose sugar is not so sweet as cane sugar—not over two-thirds as sweet. Most of our table syrups are composed wholly or in part of glucose syrup. This accounts for the lack of sweetness which is often observed in such syrups. "Karo," so largely advertised at the present time, and which is a very excellent table syrup, is composed of ninety per cent. of glucose syrup and ten per cent. of cane or sorghum syrup.

Glucose is usually put on the market in the form of syrup of which there are several grades and is worth from one to one and one-half cents per pound wholesale. It is used largely in the manufacture of the cheaper candies.

Glucose sugar is also manufactured and can be had on the markets.

NOTHING WASTED.

Observe that in all of this, nothing has been wasted. Every thing is saved. Materials which a few years ago were considered useless or as having little value, now find ready sale. At one time the millers of Michigan could not sell their bran. There are probably those present who can remember that in that early day, one of the conditions upon which the Michigan miller purchased his wheat was that for every load purchased from the farmer the farmer should haul away a portion of bran and dispose of it in some way. Thousands of tons of wheat bran have been thrown into the streams to be carried away. Today not only is there not this waste of wheat bran but corn bran is saved and sold and is recognized as having a feeding value.

It is claimed by the manufacturers that the farmers of Iowa, for example, can sell a part of their corn and with a part of the proceeds purchase back a sufficient quantity of the by-products of corn from the starch and glucose factories to equal in feeding value the total corn they have sold.

How long will it be before the farmer shall have discovered all his resources and shall have learned to husband and classify them and establish their worth as has the manufacturer?

In the corn belt very few of the corn stalks are fed. The corn is largely husked from the stalk and the cattle of the farm may be turned into the field to graze upon the stover and to pick up the ears that may have been left by the husker.

In the spring the remaining stalks are broken down, or broken down and cut into short lengths by a machine made for the purpose, and plowed under. In some sections the stalks are raked into piles and burned.

USES OF STALKS.

Of late years factories have sprung up where farmers are offered perhaps three dollars a ton for their stalks. Here the woody outside portions of the stalks are removed, ground up and put upon the market at something like $6.00 per ton. Sometimes it is fed directly to stock, sometimes mixed with other materials such as refuse molasses, and fed. It is said to possess much merit as a feed. The material, however, which the manufacturer is seeking most is the pith of the stalk which is put to a number of uses. First, large quantities are pressed into solid cakes to be used between the inner and outer walls of our great battleships from somewhat below the water line to somewhat above. Should the wall of the battleship be penetrated by a projectile, the water entering and coming in contact with the pith causes it to swell and thus to close up the opening and exclude the water. Other portions of the pith are used in the manufacture of a high grade of paper resembling our linen paper. Other portions are used in the manufacture of the higher grades of smokeless powder and dynamite. Other portions are used in the manufacture of a very superior quality of varnish used in the arts. Corn-stalk pith is also used for filling in between the walls of refrigerators and refrigerator cars. It is especially valuable for this for two reasons, first, that it is a most excellent non-conductor of heat and second, that it does not pack as does most other materials, but instead keeps continually loosened up, perfectly filling the whole space.

Time will not permit a further enumeration or discussion of these uses; but notice that here again there is not waste; every product whether direct or "by" has a value and a use to which it may be put.

The discussion which followed was led by P. B. Reynolds, Owosso:

In the discussion of this topic, I believe we are all agreed that we have one of more than ordinary importance. In fact this crop is generally recognized as one of the most important crops on the farm. But we do not believe it is fully appreciated when we see the slack methods in culture and harvesting. We often refer to the central west as the corn belt, but I want to tell you that I consider Michigan the key to the corn center. What we lack in quantity we gain in quality. When we note the improvement in the past few years and the large areas of corn successfully grown this fact becomes apparent.

In the breeding of our stock, after years of careful attention, it has become possible to produce animals with general uniform characteristics, but did you ever plant an ear of corn and produce more than a very small percentage of ears, that had the general characteristics of the parent ear? There are a few rules, if observed, by which any farmer may improve the quality and productiveness of his corn and other grains. The vitality of our seed depends upon three factors: First, the maturity of the seed or perfect development, second the vigor and health of the parent plant and third, the saving and storing of the seed itself. In selecting the best ears this can be done before the crop is harvested. We prefer those that hang down or droop, as this denotes solidity and a small shank. So important is it to save only from the strongest and most productive plants, that every farmer ought to plant in some place, where he can give the land special preparation, and plant in the most favorable time to obtain quick germination and give the crop the best possible care and cultivation so as to secure the fullest development of the plants.

The question has been asked, to what extent is it prudent to breed up the protein content of our corn. While it is very desirable to have a full and well-developed germ, which denotes strong vitality, we should not lose sight of the point, generally overlooked, that nitrogen obtained through any crop except a leguminous crop, is exhaustive to the soil,—only plants having nodules and nitrogen-fixing bacteria being able to take up free nitrogen from the air. But when we attain a pound of nitrogen through clover and other legumes, the soil has not been exhausted as would be the case if the same amount were obtained through a plant like corn. On the other hand the carbonaceous matter of corn is taken from the air and is produced without exhausting the soil. But we can with profit develop the starch-producing qualities of the corn plant, for which our State is so well adapted by nature, and with which it has succeeded so well in the past.

By judicious preparation and cultivation it is possible to greatly improve the yield and quality of our crop. The better preparation should begin before the crop is planted, putting the soil in a better physical condition. The corn plant is a deep feeder so if we have a hard sub-soil it should be loosened. The sub-soil plow is expensive, and while it gave us excellent results we are depending upon clover which does it effectually and cheaply, as it is a deep rooter and furnished a part of the humus desired. The value of a crop depends upon the economic manner in which

it is utilized, and as forty per cent of its value is in the stalks we believe, after fifteen years experience, that at least a portion of the crop should be utilized for silage. To secure the greatest value from the crop and to keep pace with the commercial world the farmer must study economics on the farm.

SUGAR BEETS, THEIR PLANTING AND CARE.

BY L. W. OVIATT, AUBURN, MICHIGAN.

We feel that to us has been assigned (possibly very unwisely) the discussion of one of the most important questions that will be discussed at this meeting. And that you may better understand us, we will briefly state our position regarding this industry.

Many of you will remember when we sat in this room, and listened to a discussion of this question by the late Doctor Kedzie, before earth ever had been broken for a sugar factory in Michigan, and how he as a a result of years of most careful and painstaking investigation, presented a chart showing by colored lines the average rainfall, mean temperature and hours of sunshine for each month of the beet-growing season, of the principal beet sugar producing countries of the world, as well as of our own State, where at that time not a pound of beet sugar was produced. He showed conclusively that the conditions were favorable to our becoming one of the best sugar-producing countries of the world, and in conclusion said that in his judgment there was no more need of our going abroad for our sugar than there was of our doing so for our potatoes, flour or pork. Let me say just here that had this Agricultural College and Experiment Station never done anything else than to establish the sugar interest in Michigan it has been and will be worth to the State all it has cost.

We went out from this hall that day with the firm conviction that when both producer and manufacturer learned the business *thoroughly*, as we are only just beginning to do, it would become one of the most satisfactory branches of agriculture for our State and although we have never climbed the mountain-tops of anticipation along this line we have never seen anything to change our first convictions however much injury has been done to the business by exaggerated and visionary statements.

Our position might be illustrated by a stake driven out a little from shore on the beach when the swells are coming in. Sometimes the wave of public opinion would run high over our heads and we would be earnestly cautioning our friends to go slow and be careful, then a little reverse would come and we would find ourselves standing out very prominently and urging them not to be discouraged but to try again, and since the exceptionally unfavorable conditions of the past two seasons, we find this usually the case.

We shall try to touch particularly those points where we think the greatest mistakes are made. First, if sugar beets are to become a permanent factor in Michigan agriculture, they must be given their place in the regular crop rotation, and as they require less acreage than other

field crops, we can select those parts of our fields that are best adapted to their growth, but never plant beets on soil infested with June grass. Be very sure to have the field well plowed. Let me emphasize this point, for if a field be poorly plowed and specially where June grass is present there is but one inevitable result and that is a *failure.*

Let the land be plowed either the fall before, which is best, or as early in the spring as possible, without injury to the land. Then work thoroughly and often until seeding time. Never wait until ready to seed before preparing the land. If prepared thus early, the land will become well firmed down to the sub-soil, and with a fine surface seed-bed.

Beets, to do their best, must have firm footing. This firming process will do more to insure a perfect stand of beets than anything we know of. You have only to notice the headlands in any beet field to become convinced of the fact. The matters of amounts of seeds used, width of rows, and distance of thinning that is usually made so much of, we consider of comparatively minor importance. Use plenty of seed; say fifteen pounds per acre, to insure perfect stand of beets, and plant in rows eighteen to twenty-four inches apart. We are coming to favor the wide rows, because the little difference in the land occupied will be more than made up by the ease of working and the larger growth of beets; thin to at least eight inches in the row for good rich soil and wider for a thin soil, and do this at the *proper* time.

Now if I were to advise the beet growers of Michigan in a way to help them in all their operations, and had to condense it all into three little words, those words would be, "Be In Time," "Be In Time." Especially is this important in the matter of thinning. Remember that not only do the weeds take advantage of delay, but also each beet plant in the row is a weed to its neighbor. Now to illustrate, let us take two rows, side by side, in a field that has been reasonably well handled up to this point. One row we will thin and weed just as soon as the young beet is large enough to grasp readily, to at least eight to ten inches in the row. It will look as though we were leaving nothing in the row at all, but we need not fear. Now we will let the other row stand, as hundreds and thousands of acres of beets in Michigan do stand each year, until the weeds and beets have grown into a mass four, six or even eight inches high. Then come back and weed this row. We will find the young beets have long, slim, tender leaves, very light and sickly in color and in removing the mass that surrounds each beet, we will so completely destroy its root system that it simply has to stand still, if indeed it is able to stand at all, until it can throw out and develop an entirely new root system, and we find the cost of weeding will be nearly if not quite double the expense of weeding the other row.

Now if we notice the beets in the first row, we will find them with a deep, rich color, stout, blocky little fellows that are ready to do business from the start. The truth is, on this row with reasonable care thereafter, there is a prospect of a handsome profit, while with the other row conditions will have to be very favorable indeed for it to pay its way. When we allow our beets to stand too long before thinning, we do two things, we multiply the cost and divide the result, and right here is usually the dividing line between success and failure. After thinning, give the beets thorough tillage and good results are almost sure to follow.

Now, I am not "a prophet or a son of a prophet," but I am going to predict a few things.

First, the manufacturers of beet sugar will eventually so learn their business that they will utilize all the by-products and turn into cash sufficient to pay the entire expense of manufacture, as other manufacturers of similar products do, and thus be enabled to pay a better price for beets.

Second, the shipping facilities will be so much improved and freight rates reduced that this will again wield a powerful influence in making the business a profitable one.

Third, we are not just ready to say in what way it will be accomplished, but the day is not far distant when every farmer can haul his beets to his nearest shipping point and although we do not favor a flat rate, then and there receive his cash for the same as he now does for wheat, potatoes or hay.

And last but not least, we, as farmers, will continue to learn better methods until the cost of production will not exceed three-fourths of the present outlay. Under these conditions the production of sugar beets in Michigan cannot fail to be thoroughly satisfactory and we can all sing, "Michigan, My Michigan."

HARVESTING THE SUGAR BEET CROP.

BY HOWARD B. CANNON, ROCHESTER.

When field tests show a satisfactory percentage of purity in the juice of the beets the harvest may begin. Early maturing beets should be ripe by the first of October. The season and the weather are more favorable for harvesting than is the case later. The enterprising agriculturist will strive toward this end in selecting the beet seed adapted to the soil upon which the crop is to grow.

The first operation of harvesting is to loosen the beets by the lifter. This machine runs like a subsoil plow. Two types of the lifter are in use, the one having two prongs and running astride the row, the other the side-bar lifter which is run close alongside the row. Workmen follow the lifters and grasp the beets by the tops, pull them and throw them into windrows. The beets from eight rows may be thrown into one windrow to advantage.

Lifting should not precede pulling more than a few hours, that unnecessary wilting of the beets may be avoided. The beets when once disturbed lose weight; very likely this loss goes on more rapidly while the leaves are yet functional. It seems excellent practice to top the beets while they are yet fresh and crisp. The neck of the beet is clipped off below the lowest leaf scar. Men become skillful at this work. As the beets are topped they are tossed into crates, or into small piles on the ground. The beets are now ready for delivery to the sugar mill sheds or the car. This work should be done promptly to avoid, as far as possible, the withering of the beets.

As the harvest proceeds the company's sheds are filled and though the campaign begins, the slicers cannot keep pace with the harvesters. From this fact arises the necessity for storing a portion of the crop for later delivery.

Mr. Woodrow, agriculturist of the Detroit Sugar Company, kindly explained his method of pitting which is simple and satisfactory. Having selected a handy place for the pit where drainage may readily be provided two stakes are set to indicate the ends of the proposed pit. These stakes are set ten feet apart. They serve as guides for the plowman who throws a furrow towards the *center*, so adjusted that the space between the upturned slices is about six feet across. The furrow slices serve to keep the beets in bounds when forked from the wagon. The open furrows provide drainage; they should be extended beyond the lower end of the pit as far as is necessary. Each day a portion of the pit should be completed. The beets are heaped up as high as they will lie nicely, about four feet, and immediately covered. Next to the beets a little marsh hay may be placed, or a thin sod may be obtained by the plow. If the pit is made on sod ground, the sod, laid grass side down, serves admirably to keep the covering soil from falling among the beets. On either side of the pit a board, an old fence board will do, is laid lengthwise. The ridge space above the boards, perhaps eighteen inches across, is covered by hay, stalks or tops. The purpose of the boards projecting at the pit ends is to admit of hitching a team to the frozen crust when opening the pit. A few strokes of a pick cracks the cover and the team does the rest. The work of opening the pit is thus done cheaply and cleanly.

When the storage pit is made, if the weather is yet warm, only a light cover of soil is placed over the beets. The ridge space is never covered by soil, for the beets require ventilation. As the weather grows cold, soil to a depth of eight inches should be shoveled upon the pits. This may readily be provided by plowing.

A good pit has a smooth, hard bottom. If this condition does not already exist it may be brought about by plowing and working the area to be used for the purpose. The time and energy saved when the pits are opened will pay for the pains taken.

Under favorable conditions, Mr. Woodrow says it has cost only 4c a ton to pit beets and less than 25c a ton to pit them and deliver them on the car afterwards.

If the harvest can take place when the ground is dry, it is done pleasantly and at the minimum of expense. The tare runs low; but little dead-head weight has to be handled. Good beets properly pitted come out with diminished tare, but where the work has been carelessly done, the heaps made small and soil allowed to run among the beets, where it freezes to them, the results are disappointing. The grower does not like to haul dirt, and the sugar companies do not intend to pay for it at beet rates.

The necessity for storing a portion of the crop is somewhat of an advantage to the growers since it prolongs the season of delivery till after Jack Frost has built a macadam road to every grower's door. The advantage is with the man whose storage pit is readily accessible so that maximum loads may be hauled, and even after winter sets in, his team may continue earning good wages.

By every process of hauling, the grower experiences a loss of weight as compared with the fresh beets. This is in part made good by the increase in the sugar content provided the grower does not sell on the flat rate plan. Those who have occasion to store a part of the crop will likely find it to their advantage to keep the beets from freezing, at least till the pits are opened. In this connection a word from Mr. Newton Burns, of St. Louis, will be of interest.

Mr. Burns had pulled a beet and left it exposed to observe its loss in weight. He says: "I have weighed my beet. When harvested its weight was 4 10-16 pounds, six weeks later it weighed 3 14-16 pounds and on February 1st it weighed 2 4-16 pounds. One of my neighbors drew four loads per day to the factory, loading two in the afternoon and letting them stand until morning, and there was about 200 pounds less, every day, on these morning loads than on the loads which he drew directly from the field to the factory.

"My last beets, which I drew in January, weighed 6,470 pounds per load. The same number of bushels taken in November would have weighed over four tons. I am convinced that no one can afford to let beets freeze up and the quicker they can be taken to the factory the better. From my experience, I shall hereafter cover mine with tops as soon as I can after they are topped. Those which I will be obliged to hold for a December or January delivery I shall place in long piles, putting every 10 or 12 feet a tile up through; then cover with leaves and a good covering of dirt, and load and haul to the factory the same day, never letting them stand over night on the wagon or sleigh."

Mr. Suydam, agriculturist of the St. Louis factory, writes that unfrozen beets taken from the pit and exposed to cold weather over night will shrink from 3 to 5 per cent. One week's exposure will shrink them 10 per cent.

It is evident that the farmer living within hauling distance from the mill has much advantage over those who must ship by rail. There is usually considerable delay in the movement of freight of this class; and then cars come handy as portable store houses. Where companies receive beets and take samples for tare and sugar testing at weigh stations, the distant grower has small cause for complaint.

Concerning the matter of tare, where all parties wish to give fair treatment there need be no occasion for hard feeling. The more samples the better. An experienced yard man selects a sample which is representative of the load. This goes to the tare room and ten kilos are taken to wash, re-top if necessary and then re-weigh. The resulting loss is the tare from the sample. The chemist obtains his sample for testing for sugar content from the same beets. This method seems sensible and fair.

Since the more samples taken the nearer the result will come to the absolute truth, there is an advantage with the grower who hauls to the factory or to a receiving station. The wagon load man has the best chance.

Mr. Jotham Allen, of Alma, then explained his method of pitting beets. If placed in a large pile immediately after pulling and well covered with beet leaves, there will be a very slight shrinkage. If the weather becomes cold, it will be well to throw some dirt over the beet leaves. When the beets are pitted or piled in small heaps, they will be poorly protected from the changes in the weather.

The best results at Alma are secured with the rows twenty inches apart and the beets ten inches apart in the row and this also reduces the cost of thinning. Many of the failures are due to using too little seed, and to late thinning. Any treatment which does not insure the plants a vigorous start will make a marked difference at harvest time. A rational use of fertilizers is also profitable, as, in unfavorable seasons, it gives the plants a good start and if the crop is thinned at the right time and properly cared for it may add 50 per cent. to the yield.

The discussion proper was opened by Colon C. Lillie, who advocated the growing of sugar beets because he is in favor of fostering and developing an industry which gives work to Americans. He is particularly pleased with the beet crop, as it fits well into the rotation and does not conflict seriously with other crops grown upon the average farm.

With some people the matter of shrinkage is a great bugbear, but this is really due to the loss of water and it does not materially affect the sugar content. If the beets are sold by test, it really is to the advantage of the grower to have them shrink as he has so much less weight to haul to the factory. Of course, if sold at a flat rate, shrinkage causes a loss to the grower.

Because one load of beets does not test as high or weigh as much as another, does not necessarily mean that the test is dishonest or that the beets have lost sugar. Beets from the same row often vary to an appreciable extent in the percentage of sugar and in many cases the factories are unjustly criticised in regard to the tests and tare. On the other hand, high tare is frequently the result of improper topping by the tare man who seems to have acquired the habit of cutting a certain amount from each beet whether it requires it or not.

CUCUMBER CULTURE.

BY M. L. DEAN, AGRICULTURAL COLLEGE.

The growing of cucumbers for pickles and seed has increased rapidly during the past ten years until Michigan ranks among the first states in the attention paid to this crop.

The first factory was established in 1878. At present there are fifteen establishments with nearly 200 salting stations, representing an investment of $872,500. These probably handle 95 per cent. of the cucumbers grown. Seven of these firms have 61 salting stations in 28 counties and, in 1903, contracted for 7,834 acres, from which they received 506,039 bushels of cucumbers, or an average of 63.66 bushels per acre. The yield ranged from 15 to 150 bushels per acre. The value of the manufactured products is estimated at $2,027,180.00.

Montcalm county supplied the bulk of the cucumbers for eight companies and with Allegan, Berrien, Van Buren, Bay, Wayne, Kent, Jackson, Mecosta and Branch counties furnished 80 per cent. of the acreage. At the present time nearly as many acres of cucumbers are grown in Jackson county for seed as for pickles. The profit per acre is about the same, there being much less labor required in the harvesting of the seed crop than in the gathering of the pickles.

The contract price for pickles is 60 cents per bushel for No. 1 and 15 cents for No. 2. The No. 1 pickles must be from two to four inches in length, regular in form, and the No. 2 include all over that size. Besides drawing heavily upon the vitality of the plants, they barely pay the expense of picking and hauling. The profit depends largely upon the location and care taken in the preparation and cultivation of the land and in picking the crop. The cost of growing pickles varies from $25 to

$35 per acre and the possible profits may be $50 and even more per acre.

The seed is usually furnished by the pickle company and a liberal amount should always be used. Many new growers make the mistake of contracting for too large an acreage. Better results will be obtained with from two to five acres until the grower has had some experience in handling the crop.

The soil should be well drained, warm loam in as good a state of fertility as possible. If manure is abundant, a liberal quantity of it should be spread over the field and plowed under early, after which the land should be worked frequently up to the time of planting. If the supply of manure is limited, it can be used in the hill by placing it in a hole and covering it with two inches of soil. Commercial fertilizers can also be used in this way very successfully and will also give good results when sown broadcast just before the last dragging previous to planting. A good fertilizer for the purpose would contain 5 per cent. of nitrogen, 8 per cent. of phosphoric acid and 7 per cent. of potash, using from two to five hundred pounds per acre, according to the condition of the soil.

The planting should be done between June 1 and June 15, according to the condition of the soil and the weather. As soon as the plants are up, cultivation should be commenced and should be followed thoroughly as long as possible without injuring the vines. Shallow working of the soil is advisable in order to provide a dust mulch to conserve the moisture. If weeds or grass start, they should be removed with a hoe if necessary. Cucumbers may be planted either in hills, six or eight feet apart each way, or in drills six or eight feet between the rows and the plants thinned to twelve or eighteen inches. In hills, only four of the strongest plants should be left.

The picking should be very carefully done because if the vines are injured, or any of the cucumbers are left until the ripening stage is reached, the development of blossoms will be stopped. The vines should be handled very carefully and the pickles should be pinched off with the thumb and finger. The profit depends upon the quantity of No. 1 pickles secured and in warm weather if any of these are left upon the vines 24 hours too long, they become No. 2's. Ordinarily it will answer to pick them every other day, but if they are developing rapidly daily picking will give the best results. In some sections the growers gather the crop for pickles during the early portion of the season and allow the later ones to ripen for seed.

By planting rather late and using an abundance of seed, little harm is generally done to the crop by the striped beetle. In sections where the industry has been followed for a number of years, there is some trouble from the mildew or "wilt," but by spraying the vines with Bordeaux mixture just before they blossom and keeping it up once a week until the crop is nearly harvested, the injury can be almost entirely prevented. If this is not done, serious harm may result.

If the crop is properly grown and handled, it will, under favorable conditions, yield a good revenue. No crop leaves the land in better condition than cucumbers for wheat or rye. It is equal to, if not better than a summer fallow and the profit from this crop will lessen the cost of growing the wheat, thus increasing the producing value of the land. Clover is valuable as a crop to precede a crop of cucumbers in the rotation.

The discussion which followed was led by Lees Ballinger, manager of the Keokuk Canning Company, of Lansing, who spoke as follows:

While most farmers are familiar with raising cucumbers in a small way, comparatively few have any knowledge of the industry when conducted upon an extensive scale.

One of the first and a vital requirement for the successful raising of cucumbers lies in the selection of a suitable soil and location. The best land for this crop is what is commonly known as a sandy loam with a clay subsoil. Clay loam if not too heavy also answers well. The main thing to have in mind is that the soil must be of such a nature that it will readily respond to cultivation, and that it will work up nicely and be free from clods. The ground may be high or low but if bottom land is chosen, it should not be of a mucky nature, as that will cool off too quickly at night, while cucumbers need to grow twenty-four hours every day. It is also of the utmost importance that the land should be well fertilized, and while commercial fertilizers are good, there is nothing that will answer as well as decomposed barnyard manure, which contains a large amount of humus as well as nitrogen, phosphoric acid and potash, which are the principal elements needed by cucumbers.

The most successful cucumber raisers of the United States long since recognized that by applying from forty to sixty tons of manure each year, they could greatly increase the yield of cucumbers. In some instances they have been able to secure from three to five hundred bushels of pickles per acre. Its use is found very profitable even at one dollar a ton. Anyone contemplating the raising of cucumbers should not overlook the importance of having the land well enriched and if but a limited supply of manure is available, it will be well to place a shovelful in each hill and after mixing it thoroughly with the soil, place a couple of inches of loose dirt on the top.

The question has often been asked, "How do you kill the weeds?" The answer is very simple. Plow the cucumber land at the same time you plow for earlier crops and drag it often up to the time of planting. In this way all weeds which start will be destroyed and the land will be clean for the cucumber crop. Plant the seed from the first to the fifteenth of June, covering it in a wet season about one inch and somewhat deeper in a dry season especially if the soil is sandy. This late planting is advisable for two reasons, first that the crop may escape late frosts and to lessen the injury from the cucumber beetles. It will also be well to use a considerable excess of seed in order to provide food for the bugs as well as for the crop. When the vines reach the fourth leaf, the surplus plants may be removed, leaving about four to each hill, or about twelve inches between the plants when in drills. Both of these methods of planting give good results. The rows are generally six to eight feet apart. In either method of planting, a horse and cultivator should be used to keep the land in good condition and one or two hoeings will be needed to keep the clean after the vines begin to run, up to the time of harvesting the crop.

After the vines have begun to spread considerably, the usual method adopted by cucumber growers is to allow them to take their natural course with the result that ultimately the vines fill up the intervening spaces and cover the ground. Hence many of the best cucumber raisers have adopted the system of training their vines, that is turning the ends of the vines back into the rows, thus keeping a clear space for the pickers to walk. This lessens the injury of the tramping of the vines and, as it is easier for the picker to find the cucumbers, few large ones will be left upon the vines. The cucumbers are pinched from the vines with the fingers and

not cut with a knife or shears, as people generally believe. This greatly facilitates the picking and relieves the picker of much unnecessary labor. When the vines are bearing well a good picker can gather ten bushels of cucumbers in a day. In some cases the quantity has reached twenty-five bushels, but this is the exception and not the rule. Usually it is necessary to pick a patch every other day and as a picker can do about half an acre in one day, each acre planted to cucumbers will give steady employment to one person during the picking season. During warm weather when the yield is heaviest it is sometimes necessary to pick over a patch every day. Cucumbers are harvested during the months of August and September, the season lasting from five to six weeks, but the first severe frost will bring it to a close. There is little risk in raising this crop as the labor up to the time of harvesting is very slight. The labor required is at a time when general farm crops interfere the least and the same labor can be utilized in the tending of sugar beets, previous to the time of harvesting the cucumbers, and in topping and pulling the crop, after the frost has killed the cucumber vines.

For controlling the beetle some cucumber raisers recommend a number of remedies. One of these is air-slaked lime; another a mixture of two-thirds lime and one-third land plaster; a third is a mixture of a hundred pounds of land plaster and two pounds of sulphur; a fourth, tobacco dust sprinkled with carbolic acid; a fifth is a spoonful of asafetida dissolved in alcohol in ten quarts of water. There is no doubt that these remedies are worthy this name, but practically the solution of the insect problem lies in late planting and an abundance of seed.

Every farmer will find it to his interest to plant two or three acres of cucumbers, which will bring him a steady income during the season when he is realizing no profits from his other crops; a crop which responsible children can look after as well as a grown person and the labor upon which must be done at a time when he can best attend to it. The cucumber industry has succeeded in most states of the Union, but in no states has it done better than in Michigan. It is not an uncommon occurrence for a man to market one hundred dollars' worth of cucumbers to the acre, while the average returns have been not far from fifty dollars. If you but try this industry, I assure you you will profit by the experiment and you will wish to increase your acreage another season.

LIVE STOCK.

Thursday Afternoon.

The chairman of the session was Robert Gibbons, president of the Michigan Live Stock Breeders' Association. It had been expected that pupils from the State School for the Blind would be able to furnish music and recitations, but owing to several cases of measles among the college students, it was thought unwise to permit the pupils from the School for the Blind to attend the meeting, and several musical selections were furnished by the department of music at the College.

The first address upon the program was upon "Principles of Live Stock Breeding," by the Hon. W. A. Harris, of Chicago, formerly United States Senator from Kansas, who had promised to be present, but was prevented by an important business engagement. Professor R. S. Shaw, of the College, kindly consented to include this subject in his talk upon "Typical Animals for Feeding," which was given at the close of the session. The topics assigned to Hon. L. W. Watkins, of Manchester, "Economical Feeding of Steers," and to A. M. Welch, of Ionia, "Feeding Sheep and Lambs," were, in the absence of these gentlemen, ably presented by H. H. Hinds, of Stanton, and N. B. Hayes, of Muir, abstracts of whose addresses are given.

The session was opened by the following address by the chairman:—

IMPORTANCE OF LIVE STOCK HUSBANDRY.

BY ROBERT GIBBONS, DETROIT.

It is with great pleasure that I greet you this afternoon, more especially as the theme for discussion—live stock—is one in which I take a great personal interest. It has been well said that agriculture is the surest foundation for the nation's prosperity. It is a proposition that no thoughtful man will question, for while everything else may fail, and financial disaster and panics shut up factories, put merchants out of business, and close up banks and mines, the earth, as it has since the earliest history of mankind, will continue to bring forth its increase, and finally enable the nation to recuperate from its losses. And this great power of production, which is being extended year by year to meet the growing requirements of the civilized world, does not destroy or injure any other interest, but like a beneficent Providence aids and encourages all others. It is agriculture which furnishes the inspiration for progress and development; without its aid there can be neither. The great essentials of mankind are food and clothing, and agriculture furnishes both. The more liberally they are furnished the greater will be the development of the individual and the nation. Civilization's progress, therefore, is

based upon the ability of the agriculturist to not only supply the needs of himself and family, but also those engaged in other vocations. For its own safety, therefore, the nation must encourage those engaged in an avocation upon which the success of all others must depend.

The particular branch of agricultural production we are to discuss this afternoon—live stock—is one of its greatest essentials, because it not only has to do with supplying an important food element, but also with the conservation of fertility in the soil, that its productiveness may increase from year to year, rather than decrease. The improvement of the live stock of a country, therefore, is of the utmost importance, as it serves to make its agriculture more prosperous. If agriculture is the basis of a nation's prosperity, improved live stock is the basis of agricultural prosperity.

Of course we have those among us who assert that mankind should become vegetarians, and under the influence of faddists and manufacturers of cereal foods, some people have been foolish enough to accept such theory and attempt to live up to it. But the natural instinct of mankind and the history of nations since time began, show that the meat eaters have always been the prepondering force in the advancement of the world, while the vegetarians have become weak, timid and irresolute, and incapable of protecting themselves from the aggression of others. (The great reason why today the Americans are a dominating force in the world is not because they live in the United States, but because they are the best fed, clothed and housed of any people in the world, and their food is of the best description.) It is the good red blood that courses through the veins and nourishes the brain that makes the American sailor and soldier the best fighting men living and American inventors and business men the most progressive. And that blood never would be furnished with a vegetable diet. We must have beef, mutton, pork and dairy products, and the products of the poultry yards also, to build up the nation through the development of the individual. The improver of live stock, therefore, has a most important mission in the world, and only good can come from such assemblages as this, where questions relating to all branches of the industry can be discussed fully and freely.

To get the most good of this meeting let every one take part in the discussions, and give the results of his experience and observations for the benefit of others.

Our program is quite lengthy, the topics are important ones, and we have the right kind of men to talk on them, so let us have a live and useful meeting that will do us all good.

THE ECONOMICAL FEEDING OF STEERS. (Abstract.)

BY H. H. HINDS, OF STANTON.

Mr. Hinds spoke of the success which had been obtained by Mr. Watkins, who was upon the program to give an address upon this subject, in the feeding of steers. Mr. Watkins' methods differ radically from those used by many feeders. The steers are kept in large yards where they have an open shed as a shelter. Their feed consists largely of corn from the shock. A somewhat similar method of feeding is pursued by Mr. Hinds. For the successful growing of steers from birth until ready for market one should have a grass farm. Grass is the basis of success in steer feeding, corn being merely a giant grass.

Alfalfa makes an excellent fodder and the prophecy is made that within the next ten years Michigan will take up this crop as she has the sugar beet. Of the various concentrated feeds nothing is better than cotton-seed meal, but pains should be taken to have it pure and its excessive use should be avoided. The best way to market our crops is on the hoof and I would like to have each steer walk into the car carrying 100 bushels of corn, with two pigs following.

We have been told that we must have bacteria in the soil in order to secure a catch of alfalfa and have it thrive, but this is not so sure. I have sown clover without any bacteria and secured a fine catch and a good crop. Whatever the experimenters say, alfalfa is bound to come to the front in Michigan.

H. F. Probert, of Jackson.—Alfalfa on my farm last year produced eight to ten tons of dry hay per acre in three or four cuttings on fields sown two years ago. The soil was a mixture of clay and sand and although naturally fairly rich, it was top-dressed in the fall or winter. In this case the soil was not inoculated with bacteria. The alfalfa is sown at the rate of 15 pounds of seed per acre with oats as a cover crop. Beardless barley also answers well. A nurse crop for alfalfa is desirable as it affords a protection for the plants and keeps down the weeds. The nurse crop should be cut for hay and the alfalfa should be cut as soon as the blooms show a purple color. Alfalfa also makes an excellent pasture if used judiciously. Twenty acres will pasture 30 or 40 head if only allowed to graze an hour or so each day. The injury from the winter-killing of alfalfa can be greatly reduced or prevented if sown early. While excellent results have been secured upon a soil of a clay nature underlaid with gravel, some of the best crops have been secured upon sandy loams, but whatever the soil, the best results cannot be secured unless the land is rich.

FEEDING LAMBS FOR PROFIT.

(Owing to the unavoidable absence of Mr. A. M. Welch of Ionia, to whom this subject was assigned, Mr. N. B. Hayes of Muir was asked to speak upon the subject, and the following is an abstract of his talk.)

BY N. B. HAYES, MUIR.

The following rules for feeding lambs in Michigan will, if properly carried out, give good results.

1st.—Select good, healthy stock.

2nd.—Do not feed any grain before putting in the barn, if your pasture is good.

3rd.—Do not leave them in your pasture field too long after the cold weather comes or they will lose in weight.

4th.—Put on full feed as soon as you can with safety. A full feed is all the grain they will eat up clean.

5th.—Keep their racks and drinking tanks absolutely clean and sweet, as a lamb is one of the daintiest of animals. Sweep your racks clean before feeding grain.

6th.—Have for your shepherd a quiet man and allow no strangers in the barn.

7th.—Keep your barn cool and the air pure, but cold air does not mean that it is always pure, neither is warm air necessarily impure.

8th.—Have your lambs weigh more at night than they did in the morning and when they are fat, send them to market. If you wish to feed longer, put in a fresh bunch. A lamb that will not get fat in ninety days has no longer a place in the feeding barn.

9th.—Give your lambs a variety of food and always keep salt within easy reach. Make corn and clover hay the main feed.

The discussion was led by Peter Voorheis, Pontiac, who spoke as follows:

The feeding of lambs in Michigan is becoming an important and generally a profitable industry, many more being fed than are bred and grown here, and the number of farmers who make lamb feeding a permanent branch of their annual operations is increasing.

As it is with other industries, lamb feeding is not always rose-colored, but taken one year with another, with judicious management, I think it will prove as profitable as any other branch of farming, although we may not be able to count all the profits in dollars and cents.

It affords an excellent home market for the hay and coarse grains raised upon the farm and furnishes profitable employment during the winter months. Besides it is the means of enriching and keeping up the fertility of our farms, from which we can harvest larger and better crops; for this last reason it is difficult to estimate the profits resulting from a season's feeding. The man about to engage in lamb feeding has many things to consider if successful. First to be considered is the cost of production of the finished product; upon this largely depends whether lamb feeding is a success or failure. The cost of the lambs, the value of hay and grain fed, the freight getting them from, and the expense getting them to market, as well as judicious feeding, are all factors which have a bearing on

the result. Like any other industry, it must be managed with business sagacity to insure success.

We have to contend with the feeding pens of Colorado and other states, where liberal treatment by the railroads allows them to buy their lambs in New Mexico, bill and pay freight on them to the Missouri river; ship them to the feeding pens, where they are permitted to hold them until they are fitted for market and then reload and send them forward under the same billing, being only asked to pay freight on increased weight.

Then where there is so much constant sunshine, lambs can be fed in open pens and no expense of covered sheds is necessary. They also have the cheaply grown alfalfa hay and low price corn, which proves to be a great combination for lamb feeding. To meet this competition, many think they can be more successful by breeding their lambs from ewes of some of the early maturing breeds, forcing the lambs from birth and selling as soon as fit for the block. It seems to be conceded that the greatest gains can be secured at the least cost before the lamb is ten months old, but under certain conditions it would not be the best policy to adopt this method. As alfalfa has not become (and perhaps never will) our most reliable forage crop, our main dependence is clover hay and corn silage, and if we intend to make lamb feeding a part of our business, we should so rotate our crops as to have a good supply of this product to market in the condensed form of wool and mutton, and then buy western lambs of light weight about the time we wish to put them in the feeding shed. It has proven good policy to select lambs carrying a good fleece of wool and when the latter is in good demand better results are obtained by shearing the lambs from three to six weeks before putting them on the market. This should certainly be done if they are to be carried until April or May, and especially if infested with ticks.

With this method it would be best to start in with about one-quarter pound of corn per head, twice a day, increasing gradually until the last month or six weeks, when they should get all the grain they will clean up. Sometimes other grain than corn can be fed to advantage. I have known of rye being fed as an exclusive grain ration and better prices realized for it than if sold in the market. Sometimes oats can be fed in connection with corn to good advantage, in order to balance up the ration, especially if obliged to feed hay that is mostly timothy.

It is necessary that good clean water should be where they can get it at all times and almost as necessary that a part of the ration be of a succulent nature, such as roots or silage. I have had best success by feeding grain (mostly corn) and silage in the morning, a little bright straw at noon, and corn and clover hay at night, and as long as the price of beef and mutton stand in the present ratio, I would prefer to sell the forage and coarse grains grown on the farm to the animal with the golden hoof. As a new source for a supply of lambs for feeding, the time may not be far off when we can fill our feeding pens with lambs grown on the cheap lands of Northern Michigan.

PROFITABLE PORK PRODUCTION.

BY N. A. CLAPP, SOUTH LYON.

Of all the animals that roam the fields on the farm there is none that is so often cursed by both saint and sinner as the hog. He is spoken of in derisive terms and described by a long list of adjectives that express intense internal feelings. But in spite of all the bitter denunciations and ill usage and neglect he has been compelled to endure, he occupies a very prominent position in commercial circles and supplies a necessity that can not be easily dispensed with and for which a good substitute has not been found.

The meat of the hog is sought after for several reasons. It is both palatable and nutritious. Who will decry the crisp spare rib, the rich tenderloin or sweetbread? The sugar-cured hams and shoulders and the broad side bacon are almost a positive necessity among the meat supplies, as they are easily kept and always available when needed. It bears the changes consequent upon commercial operations and transportation better than most other animal products. It has been the meat used by the laborers that have felled the forests, dug our canals, built our railroads, run the machinery in our factories, built our cities and paved their streets, and, in fact, has been a potent factor in the meat supply with a very large percentage of those, who, by their toil, keep in motion the wheels of our modern civilization. It is one of the most economical or cheapest of the meat foods used and can be the most economically produced.

We believe we are safe in asserting that in these United States, the hog and his products have lifted more mortgages, paid more debts, bought more necessities and comforts for the family, and made more homes happy than the product of any other animal kept on American farms. Broad as this assertion may be, the vast sums could be greatly enhanced if better blood were used in breeding, better judgment used in making selections for breeding, and better care bestowed and more skill used in feeding and handling all the way from the breeding pens to the slaughter houses.

OLD METHODS.

In the earlier days of our farm operations it was the universal custom to have the pigs come in the spring of the year, keep them along through the summer on slops, skim-milk, grass and little, if any, grain, until fall, turn them into the woods if there was a supply of nuts for them to eat, keep them there until winter, when they were taken into the barn yard and fed just grain enough to keep them along until spring, when as soon as the grass started they were turned out to grass to live through the summer, go to the stubble fields in the fall and eat nuts until winter, and then taken to the yards to fatten for market.

In those days the hog-killing day was one of the events of the year. Neighbors changed works, made bees, and the exciting experiences that were met with were amusing and sometimes dangerous. The man or boy who got through the day without turning a somersault on the frozen ground, or come in sudden contact with some other one, was considered

fortunate. The air was rent by the merry laugh of the boys, the shouts of the man in command and the vigorous squealing of the unfortunate hogs. It was all astir indoors and out, as the women had not only their share of the work to do, but the preparation of dinner for the busy throng of men.

The next day, the dead porkers were loaded on the wagons or sleighs and the farmer started light-hearted and happy for market. Pork sold for from $10 to $15 and $16 per hundred. The process of making pork was slow, but on the whole the profits were large.

Things have changed and we find ourselves confronted by different conditions. Under improved methods of cultivating the soil for the production of feeds and the improved methods of breeding and feeding, the amount of pork produced has enormously increased. The prices for hogs are lower, and profitable pork production under present circumstances, is a difficult problem to solve.

ONE METHOD.

Large areas of land are planted to corn for the purpose of feeding cattle for beef. One of the most economical ways of feeding the corn to the cattle is in the shock. While at first thought it may seem like a slipshod method, with hogs to follow the cattle and consume the undigested grain that passes them, there is but little lost. Under this method the feed consumed by the hogs would be well nigh valueless without them to consume it, and we must admit that hogs reared and fattened in that way are produced at a great profit.

OTHER METHODS.

All farmers are not cattle feeders on a large scale, but there are products on nearly every farm that would be valueless were it not for the hogs consuming them and converting them into marketable pork. The skim-milk, whey, dish-water and odds and ends of the fruit and vegetable garden, all can be used in making up a cheap ration. The stubble-fields and apple and peach orchards are places where the hogs can be utilized with both benefit and profit.

While the hog is not considered a distinctively herbivorous animal, he relishes and thrives on a great variety of grasses that grow on the farm. June clover and alfalfa have a feeding value for hogs equal to that of wheat bran. To be fed in connection with a moderate ration of corn, we believe that the clovers are among the best and most economical feeds for the promotion of growth and maintaining the health of the animal. They are a benefit aside from their nutritive value. They aid in separating the particles of grain, thus enabling the gastric juices of the stomach to permeate the mass, and more effectively carry on the process of digestion. Experiments have shown that a bushel of corn fed in moderate rations while the hogs are on clover pasture will produce nearly, if not quite, double the amount of pork than would be produced if fed alone. Clover and alfalfa hay can be fed to great advantage in winter.

GOOD SELECTIONS AND GOOD FEEDING METHODS ESSENTIAL.

If we were asked the question, "How much pork will a bushel of corn make?" we would feel obliged to say that it depended on the kind of pig

and the manner in which it was fed. If we were to feed the old-fashioned "land shark," that is slow-growing and slow-maturing, we would not expect him to make as much pork from a bushel of corn as good individuals of the improved early maturing breeds. And, again, it would depend very much upon the manner in which the corn was fed. Therefore, the results will depend greatly upon the animal consuming the feed and the manner in which the feed is given; so we have two divisions to our subject, the selection of the animals to be fed and the methods of feeding, to consider.

IMPROVED BREEDS VERSUS MONGRELS.

While it is not our province to boom any of the breeds of swine, we feel free to say that others have done much before us in the selection, feeding and care of the pigs that have made the improved breeds more desirable and profitable as pork producers than the so-called "mongrel" hogs. We also feel free to say that not all the individual members of any of the breeds are desirable. The work of the breeder and feeder, if they are to be successful as such, is made up largely of selecting, improving and getting rid of undesirable characteristics so that each succeeding lot or crop is better adapted to his wants as pork producers than the ones that preceded it.

LEADING CHARACTERISTICS.

There are some leading characteristics that are absolutely essential and should be considered and placed first in making selections. The fact that mind controls matter is just as true in the hog as in the man, and a certain degree of intelligence is necessary to making a desirable hog. That the brain is the seat of intelligence no one will deny. Therefore, we will say, give us brain capacity that we may have intelligence, and the external indications in the hog is width at the eyes. Second, we must have appetites, which is indicated by the width just back of the eyes, the gustatory center. Third, vital energy, which is made up of large vital organs to furnish the machinery to consume, work up, assimilate, and make use of the food consumed.

EARLY MATURITY ESSENTIAL.

The terms "lard hog" and "bacon hog" are rapidly becoming misnomers in describing the hogs that the market demands today. To produce either requires too much time and valuable feed in these days of close margins in the production of meats. The excessive fat of the lard hog is considered waste, and is disposed of at a sacrifice in competition with the vegetable oils now so much used in the culinary arts. Therefore, to secure the best results it is necessary to select the growthy, early maturing hog that has a large percentage of lean, or muscle, intermingled with the fat meat. This is done by proper selection, proper feeding and keeping the animal growing and improving from birth to the time it is ready for market.

FORESTRY.

Thursday Evening.

Governor Aaron T. Bliss had promised to be present and act as chairman of the Forestry session, but was prevented by illness from doing so, and Dr. W. J. Beal, who for many years occupied the chair of forestry in the Agricultural College, and was introduced as having been among the first to agitate the matter of forest legislation and the need of better methods in the care of the Michigan forests, presided in his stead.

An address had also been promised upon the "Pulp Industry" as a factor in Michigan forestry by Hon. Arthur Hill, of Saginaw, but illness prevented his attendance. Fortunately Dr. Judson F. Clark, special agent of the Bureau of Forestry of the United States Department of Agriculture, was in the city and kindly consented to explain the work that is being done by the government for the benefit of the farmers along this line.

The M. A. C. orchestra gave several selections at the opening of the meeting and a number of songs were furnished by the College Glee Club and a piano duet by Miss Freyhofer and Miss Mack, of the department of music.

Professor E. S. King, of the department of elocution, gave a reading and his efforts were heartily encored.

After the close of the session at the Armory, the visitors were invited to attend an informal reception at the Women's Building, that they might meet the members of the College faculty and become acquainted with each other. After the close of the reception proper an hour was very pleasantly spent in the parlors and spacious corridors of the Women's Building.

MICHIGAN'S IMMEDIATE DUTY IN FORESTRY.

PROF. FILIBERT ROTH, ANN ARBOR.

Farming is the greatest industry of the State, and the farmers form the bulk of our two million people. Whatever is the State's concern, whatever is to the good of the State, or to the injury of the State, is first of all the farmer's concern, to his good, or to his injury. It is for this reason that I take particular pleasure in calling the attention of the representatives of agriculture to one of the most important subjects which can ever present itself in our State; to an opportunity to do a great and permanent good, to an opportunity of increasing for all times by millions of dollars the income of the people of our State. But I also call your attention to a leak which needs stopping and which should be stopped at once if we do not want to repeat the history of other states which have preferred to follow the ancient custom of locking the stable after the horse is gone.

Forestry is a part of agriculture; both raise a crop from the land. The crop of the forest is wood, and like wheat it is one of the staple products now, has always been, and will be so in the future. Millions of people get on without wheat; none without wood. The amount of wood used is enormous, and civilization has not helped us to economize; we are using more wood to each person than we ever did. We here in the State of Michigan use as much as anybody, and we believe in using wood, for whenever the farmer has to scrimp on improvements because timber is too high; whenever our towns have to be built of brick and stone because lumber is too dear; whenever our factories have to leave the State because they can't get timber, one of the greatest factors in the prosperity of our State is gone.

We use in our State about one billion feet of timber besides fuel, and even now we are importing. We pay a high price and a higher railroad fare on shingles from the Pacific coast, and on yellow pine, cypress and hardwoods from the South. The capital invested in lumbering in our State in 1890 was over 90 per cent. greater than it was in 1900, and the cut was proportionate. When Hon. James Wilson became Secretary of Agriculture, he said, "We use enormous quantities of sugar; why not raise it?" We use an enormous amount of timber; why not raise it? is the question we ask. Have we no land, or will timber not grow? Neither. The white pine of Michigan was famous; the oak of Michigan made Grand Rapids one of the great furniture centers of the land. But how about the land? The farmers in the well-settled, real farm counties of the State still have about six million acres which their good sense has prevented them from clearing. They are raising some timber, and they will raise more and better timber as time goes on. Michigan but yesterday was one of the greatest lumber-producing districts of the world, and today a contractor way up at Manistee fills a bill with North Carolina pine. This ought not to be. Michigan should export and not import timber. There is land to do even this. Our State is one of the leading agricultural states, but is, like most districts in the world, not all plowland. And let us be thankful that this is so. A good one-third of our farming counties are unimproved land, mostly woodlots. About 95 per cent. of the other half of the State is still unimproved and 87 per cent. is not even settled. Unfortunately, this is not woodlot, but is, as most of you know, to a considerable extent cut-over and burned-over pinery land. About six million acres of these lands, i. e., one-sixth of the land area of the State, is delinquent, is "in soak" for taxes. The State has tried to encourage settlement by selling these lands cheaply. Of late the State has started in a new direction; it has set aside a small parcel of this land and said, let us protect it against fire and let us improve it and see if we cannot get back some of our much-needed forest. This met with opposition. The two main arguments were:

1. The land is good enough for farming; why make woods of it?

2. You reserve a large body of land in our county and thus deprive us of the possibility of ever getting taxes, and yet you expect us few pioneers to keep up a decent county and town government.

Both arguments were sound. The first is sound, but based on misunderstanding of the law. The law does not and never did contemplate reserving all lands and preventing settlement of good farm lands. The Commissioner can sell or exchange good farm lands. All the law does

is to provide for a protection and improvement of these lands, and then if an actual bona-fide settler wants an 80 acres, he can still get it.

The second argument is sound and there is no answer to it. If the State of Michigan expects a new and sparsely settled county to keep up schools and roads and protect a man in his life and property, the State ought not to deprive the county of the possibility of getting the needed funds which make this possible. Every German state pays taxes on its forest lands; why not Michigan?"

But the State has made a beginning and the people have agreed to support it with a will. However, this affects but a small part of the State tax lands. The State still has a law which requires that these lands be offered for sale; it forces a sale, and that the lands be sold at prices the minimum of which is discretionary with the officials in charge. A recent sale where about eight thousand out of eighty thousand acres were sold brought about $1.25 per acre and generally these lands are disposed of at from 10 cents up. Within all the vast area of the railway grants of the west, the United States accepts no less than $2.50 per acre, and this for lands a goodly part of which are nothing but sagebush and cactus deserts, and here in Michigan we sell lands at one-half that price.

Now, the friends of forestry believe that Michigan has no desert lands; that its lands need not and should not be forced on the market at desert prices; that such an offer does not help to settle the lands with real farmers and only gives State and county a bad name. We believe that the law of Michigan should have a minimum price of certainly not less than $2.50, preferably $5.00 per acre for the land alone; that the timber, if there is any, should be sold separately at a price not below a fixed minimum; and above all, we believe that these lands should have adequate protection against the ever-recurring fires and thus have a chance to reclothe themselves with forest; and that the State should aid in this re-stocking as far and as fast as its funds permit. When that is done, Michigan will be able to raise all the timber it needs and more besides, and land which is now waste and idle and if uncared for is likely to remain so for many years, will grow a useful crop. Will it pay? The State forests of Baden, Würtemberg and Saxony bring over $4 a year net. If ours bring only a tenth of this they will be worth $20 an acre.

Moreover, we should not forget that when a State owns a forest, it gets something besides the mere stumpage. For every dollar of stumpage or direct revenue, the State gets at least another dollar in indirect revenue by having mills and shops going, and by avoiding exorbitant charges for a material so necessary to human welfare. If the State as a commonwealth has a duty of importance, it is certainly that of seeing to the welfare of the people. Here is a chance to do a great deal of lasting good, here is an opportunity for a yearly income of millions of dollars to the people of Michigan. Let the people see this, and demand that the State do its duty!

The discussion was led by Hon. Chas. W. Garfield, Grand Rapids, President of the Michigan Forestry Commission, who said, substantially:

The immediate duty of the State of Michigan, in connection with its land holdings, it occurs to me, is to put this whole matter upon a business basis; that is, the same basis that a business man would use in handling a like area of real estate as an investment. Michigan is not so desirous of securing immigrants as to offer such extraordinary induce-

ments as has been the case for years, to get them to settle upon Michigan lands. Michigan does welcome within her borders thrifty people who may be poor, but who desire to work out a livelihood in a legitimate way. It can afford to make such men inducements as to the method of payment in its land offers. However, Michigan is not land poor. It is not obliged to dispose of its holdings at a sacrifice in order to throw the responsibility of taxation on the shoulders of would-be purchasers, with a total disregard of their character or ability to get on in the world. The State has this immense area of land that has come into its hands for delinquent taxes. A business man, under like circumstances, would very carefully size up the situation, put a fair price upon the lands it seemed desirable to dispose of for the sake of getting thrifty settlers, then utilize the remainder of the holdings in such a manner as to make them as rapidly as possible, grow more valuable. This sorting process our State has never done. The State of Wisconsin, with an immense area of lands in a similar condition, has entered upon the sorting plan, with the idea of disposing of the lands valuable for agricultural purposes to the farmer, and retaining the thinner lands, not adapted to successful agriculture, to grow upon them forests for the benefit of the State, and incidentally for the benefit of every inhabitant of the State. This is a valuable step in progress, and one that Michigan could well afford to take. It should retain vast holdings of lands unsuited to agriculture, forever, and grow upon these lands forests, having in view the maintenance of a diversity of industries supported by forest crops. This is a philosophical way for the State to treat its landed investment. This plan recognizes forestry as a branch of agriculture and has in view the maintenance of the largest possible power of production from the land; and it also recognizes the principle of mixed husbandry as a most important one in connection with agriculture.

It is a mistaken policy on the part of the State to seek its development by striving to have every acre of its land under cultivation for the production of agricultural crops. An immense line of industries of vast importance to the State are supported by the production of the forest. Individuals will not undertake to grow forests, having in view the support of these industries. The State, because it goes on forever, can enter upon this project with every promise of success in the interests of its larger development. My contention then is, that the State, in handling its vast areas of lands, shall attack the problem of the wisest method in handling them in a business way, and that it shall recognize forestry as an intrinsic factor in its agriculture and shall undertake to supplement the activities of the individual with a forest policy that shall make the poorest and least valuable lands of great value in promoting its future prosperity.

To this end it is of the utmost importance that the State shall immediately take hold of the training of experts in forestry, in the same businesslike way that it has under solution the problem of educating its husbandmen in its university and college instruction; in the development of its great common school interests, the importance of this line of education should never be lost to the sight. In the future economy of the State the tree will be as important a factor as the grain or the fruit, and an educated husbandry which shall maintain the high character and standing of Michigan agriculture must include a proper training of the forester.

FOREST NURSERIES AND THEIR CARE.

BY PROF. E. E. BOGUE.

A forest nursery, like the human nursery, is a place where the little ones are grown. At first we may have a large number in a small space, but by and by the room becomes too small and it is necessary to reduce the number per square inch and this is done by transferring to places where there will be more light and air.

The locality is the first consideration, and like the human nursery, there should be plenty of light and air, although it is sometimes necessary to shut off some of the light. The soil should be in good tilth and as free from weed seed as possible. As a rule, the less a soil has been worked the less seed it contains, the looser it is and the more easily it is worked. Therefore, since a comparatively small area is required for a nursery, room can be given for this purpose where the conditions are most nearly ideal among those at hand. This need not and perhaps should not be a very rich soil. Some growers prefer a soil only moderately fertile, claiming that if the seedlings are grown in a very rich soil and then transferred to a comparatively sterile soil, their growth will be injuriously checked and the tree will be more likely to be attacked by insects and fungous diseases. Probably nothing better could be suggested at present than a virgin soil that has never been contaminated with seed of many foul plants. This condition is usually found in a piece of land recently cleared of timber. Care should be taken that the soil be sufficiently moist but well drained and at the same time not likely to wash, for the young seedlings are easily covered.

The weeds are one of the greatest enemies that we have to contend with, because while some tree seeds germinate readily, others usually lie over one season before they will germinate. During this lying-over period, weeds are likely to get a start if vigilance is relaxed. Among those that do not usually germinate the first year are basswood, cherry, and red cedar. By putting seeds into the soil immediately after stirring, the tree seeds have a more equal chance with the weeds.

As a rule, the seeds of deciduous trees are planted in drills far enough apart for horse cultivation and their care is much like that of any other crop, allowing trees to stand about a foot apart in the row. With the exception of locust and catalpa, the trees will need to stand in the nursery row more than one season.

When the nursery crop is removed it leaves the land in a somewhat impoverished condition because nearly every particle of humus matter that belongs to the crop is removed with the trees and it therefore is best to fertilize before another crop is raised. Right here is where we need the results of more experiments with commercial fertilizers in forest nurseries. It is altogether probable that some form, as ground bone, that gives up its fertility slowly, is preferable. The advantages that commercial fertilizers have over stable manure is that they are easily transported to where they are wanted and they contain no weed

seed. There is no better fertilizer than stable manure, but it is not easily and cheaply transported and always carries weed seed.

In the location of the nursery at the College, permission was given by the Experiment Station to use a triangular piece of land, three acres in extent, lying between a river and a railroad track. The slope is northern and sufficient that the soil is liable to wash at times of hard showers. The larger part of the plot had been seeded to clover after wheat and the rest had grown rape. While the piece of land was not all that could have been desired for the purpose, it was necessary that it be near the office of the department, and it is within about five minutes' walk and can be reached on a wheel. One corner of this place was plowed April 29th and pine seed planted the same day. A bed, four feet wide and eight feet long, was made in one corner, and between this and the next bed a walk, eighteen inches wide, was left. The beds are all the same width, increasing in length to forty-eight feet, when it was found convenient to have a cross path.

The soil was prepared as for fine garden seed, and then the seed was sown broadcast, intending to have between two and three hundred seeds per square foot. The seeds were then covered by sifting soil over them to the depth of about one-half inch. This excluded all lumps and stones and secured a fairly uniform depth of cover. Next the beds were stamped with a piece of plank fastened to the end of a stake. The beds were then covered with two or three inches of leaves and upon these were placed the lath screens. This made ideal conditions for seed germination. The tree seed under these conditions seemed to germinate better than the weed seed. After about a month the seed had started to germinate the leaves were removed and the screens supported about fourteen inches above the beds. The lath screens cost thirteen cents each four feet square. Strips of five-cent muslin were sewed together and stretched over a part of one bed. Beech brush were hauled from the woods, cut into short lengths and put over the rest of the beds and of the three kinds of screen used, this proved the least desirable because the sparrows were troublesome where it was used, and it was very inconvenient to handle. The first cost was less than either of the others, but it proves more expensive in the end.

Thirty-three feet on the end of one bed was fertilized with a phosphate known to the trade as "Tuscarora" at the rate of 960 pounds per acre. Another bed was fertilized with nitrate of soda at the rate of 480 pounds per acre. Another bed was fertilized with potassium sulphate at the rate of 368 pounds per acre. The results of these fertilizing experiments can not be given at this time.

The Norway pine and the lodge-pole pine seed came up well, but the White pine was very unsatisfactory, as seems to have been the case in other parts of the country last season. Several of the western conifers were started and also the southern bald cypress.

When spring opens, several thousand of the yearling seedling pines will be transplanted so that all may have more room. All must be kept screened until the end of the second season. When the plants are three or four years old, they will be ready to plant into their permanent location.

THE CARE OF THE FARMERS' WOOD LOT. WHAT THE BUREAU OF FORESTRY IS DOING TO AID THE FARMERS AND WHY.

BY JUDSON F. CLARK, PH. D.

I have been frequently asked, since coming to Michigan to explain just what the Bureau of Forestry is doing to aid the farmers in the care of their wood lots and why.

The Bureau of Forestry offers to give any farmer in Michigan, or for that matter in the United States, who makes application, expert advice as to the care of his woodlot. This advice is given by sending a man who has made a special study of the subject to the woodlot in question. After making a careful examination of the conditions on the spot, he informs the farmer just what should be done to improve his woodlot and why. He also embodies his observations on the woodlot and the treatment recommended in a report, a copy of which is sent to the owner. It may be appropriate here to add that all this is done without cost to the owner and that anyone wishing to take advantage of the offer may do so by writing Mr. Thomas H. Sherrard, Chief of the Division of Forest Management, Bureau of Forestry, Washington, D. C.

It is not the Bureau's wish to have many applications from any one locality for this assistance, but rather that there should be applications from representative farmers throughout the State, say, several in each county or, better still, one in each township. These woodlots would then be in the best position from their distribution to serve as object lessons in practical forestry for the whole community.

Now as to why the Bureau makes so liberal an offer. There are three chief reasons: The woodlots need it, the country needs the woodlots' product, and it is the duty of the Government to educate the people. I shall discuss these reasons in the reverse order.

Its duty in regard to educating the people has always been interpreted by our government in the most liberal manner and has included the *discovery* as well as the *dissemination* of knowledge. It has found expression in a variety of ways, including the establishment of a great National Department of Agriculture at Washington, and of Colleges of Agriculture and Mechanic Arts and Agricultural Experiment Stations in every state in the union.

All that can be said in favor of the undertaking by the people as a whole of such investigations in agriculture as are beyond the means and training of the individuals engaged in its practice, can be said with added emphasis in justifying this educational campaign which the Bureau of Forestry has inaugurated for the dissemination of a knowledge of improved ways of handling forest lands. I have said with added emphasis, for the study of problems connected with forest crop production and utilization present a variety of considerations—physiological, economic, and even psychological—which distinguish it as more complex than the study of the production of any other crop whatever.

To illustrate this, permit me to refer to three of these considerations which may illustrate some of these complexities. One needs to but suggest the time element required for study in the rate of growth of our various species of trees under different silvicultural conditions, or for that matter almost any study that may be undertaken with trees, to indicate as a physiological factor, the time element that all but bars individual research. It is often said that every generation must learn its wisdom by its own mistakes. This is, of course, but a partial truth in any case. It is particularly untrue in regard to forest management. Were it otherwise, forest management could never be learned. We must and do accept and practice the results of centuries of study, while we await the slow solution of those problems which are yet to be solved.

As one example of the unique economic problems presented by the study of forestry, I would suggest the peculiar relationship between *demand* and *production* as contrasted with their relationship in the case of other crops. It is well known that a keen and increasing demand for a product normally causes a rise in prices, and that higher price in turn causes an increase in production. Everyone knows that the present abnormally high price of wheat will, if maintained until after the next seeding, result in a larger acreage being sown to wheat, and finally in the production of more wheat. It is equally true of the production of beef, of horses, of apples, or any other crop whatever—*except wood.* We have now had, for a number of years, high prices for timber, and from year to year they continue to soar with no relief in sight. Have these high prices induced lumbermen generally to take better care of their lands as they have made their annual cuttings, or have they been known to reforest the areas denuded? To ask such questions is to answer them. Everyone knows that high prices have meant a larger area cut over and more carefully "skinned"—to use a slang term—of all that was of value. These areas are, in many cases, afterwards burned over by the lumbermen to protect their standing timber, and in those parts of the country where this is not practiced, it is almost certain that sooner or later, by accident or design, fire will sweep over the brush-littered area and destroy the remnant of the stand that the lumbermen spared because it would not pay to cut it. The net results then of higher prices in forest products is a larger area cut over and cut over in a more destructive manner, plus a probability of an increase in the amount of fire, all tending to *decrease production.* This is surely a fair illustration of burning the candle at both ends.

A psychological consideration is met in the attitude of mind with which the people regard or, perhaps better, disregard the situation. There are very many who admit the approaching exhaustion of our natural forest resources, but who dismiss the subject with the remark that when wood becomes too dear for its present general use, substitutes will be found. This may be true, *but at what cost?* Certainly a glance at the history of the use of wood does not justify the accepting of this answer as a discharge of a citizen's duty in the matter. It is perfectly true, as pointed out by these people, that much substitution of other materials for wood has already taken place, but what about the substitutes the other way? The substitution of rags by wood pulp in the manufacture of paper, is but an example of a long list of substitutions, and new uses that far more than counter-balance the saving that has

been made by the substitution of wood by other materials. It is a significant fact that every civilized country of which we have a reliable record is increasing, and greatly increasing, its consumption of saw timber. But it is almost startling to contemplate that it is probable that almost all civilized countries are increasing their *per capita* consumption of saw timber. The British Isles, having practically no domestic timber supply, furnish the most reliable data on the tendencies of modern wood consumption under favorable conditions for substitution. The favorable conditions for substitution in this case are normally high prices for timber (which must be imported), and an enormous domestic production of coal, iron, steel, and other substituting products. Yet we know that the *per capita* consumption of wood has increased in that country with every decade in the nineteenth century. While we have no such complete statistics of our consumption of the better grades of timber, the latest census returns leave little doubt but that the same is true in this country and even to a greater degree than in Great Britain.

Those who complacently rely on the substitution of wood by other products as a solution of the problem, have hardly thoughtfully considered the extent to which wood enters into so many manufactures as a raw material or the way in which it surrounds civilized people in every-day life as a convenience, and perhaps we may say, as a necessity.

I have said that one reason for the Bureau's offer was that the country needed the product of the woodlot. Many do not appreciate the importance of the farmers' woodlot in the National economy. Pardon a few statistics from the 12th census (1900). The average farm in the United States contains 147 acres, of which seventy-three are improved and seventy-four unimproved. This unimproved area of American farms foots up the enormous total of 426,000,000 acres. This unimproved area consists of woodlands, treeless swamps, and barren lands. A very conservative estimate of the amount of unimproved farm lands in the United States, capable of producing timber, is 300,000,000 acres. Think what this means. A vast empire of actual and potential woodlots, capable of producing, under intelligent management, much more than the present consumption of saw timber in the United States. So much for the possibilities. But the present actual production is by no means to be despised. Before giving any further figures from the census it might be well to say that figures obtained by census enumerators are prone to lie below the mark. This is especially true in regard to estimates of product given by the rural population who have not infrequently a thought of the possibility of such data being used by their mortal enemy, the tax assessor, and govern their estimates accordingly. It should also be borne in mind that the enumerators fail to reach some lumbermen whose operations are carried on on a small scale. Hence all product figures discussed may be relied upon to be below the mark.

The value of the total product of the lumber camps of the United States (including logs, bark for tanning, charcoal, rived shingles, ships' knees, posts, ties, and all other products of lumber camps) was, in 1899, 174 million dollars.[1] The value of the product of the woodlots of the United States (including "only the wood, lumber, ties, etc., which the

[1] Vol. IX, p. 817, 12th census, 1900.

farmers cut in connection with their ordinary farming operations") and not including maple syrup, or sugar,[1] was 110 million dollars. In other words, in 1899 the farmers' woodlots of the country produced an amount very nearly equal to two-thirds of the value of the product of the regular lumber industry as it was delivered at the mills.

Not only is the present product of the woodlots of very great economic importance, but it will certainly be increasingly so as the natural supplies of virgin timber disappear.

The following statistics, from the 12th census, illustrate the increasing importance of the woodlot as the states become older.

TOTAL VALUE OF THE PRODUCT.

	(a) of Lumber camps.	(b) of Woodlots.
Washington	11,532,000	1,002,000
Wisconsin	18,112,000	6,116,000
Michigan	20,462,000	7,530,000
Indiana	4,058,000	5,235,000
Ohio	4,384,000	5,625,000
New York	4,364,000	7,671,000
Connecticut	493,000	1,276,000

Washington represents the newest type. Its lumber camp products exceed that of its woodlots in the ratio of 11 to 1. Michigan has an intermediate position, having a proportion of about 2.6 to 1. New York has the balance turned the other way, and in the proportion of 1 to 1.8, and Connecticut, where lumbering, as a business, has become very much reduced, has the proportion of 1 to 2.6 in favor of the woodlots.

It is only fair to add, however, that the product of the woodlot is at present used largely, though by no means wholly, in an un-manufactured or slightly manufactured form (cordwood, railway ties, posts, etc.), while the product of the lumber camp is in a much larger degree the raw material for a vast series of manufacturers. It is also worthy of note in this connection, that a farmer is usually his own logger. This work is done at a time of year when there is little else to do, and in many cases the entire amount received for the product may be regarded as clear gain to be credited to the woodlot. The lumberman, on the other hand, must build his camps, purchase his horses, camp supplies, tools, etc., and especially employ his labor, the cost of all of which must be deducted from the sale value of his product in determining his profit. The census shows that the value of the stumpage of the cut of $174,000,000 worth of product by the lumbermen during the census year to have been $58,177,000. It is not improbable that the farmers' cut of $110,000,000 represents as large a real stumpage value.

The value of the woodlot as a national asset can hardly be over estimated. I have already suggested that, devoted to the production of timber under correct management, the woodlot area is capable of supplying the present needs of the nation for timber and to spare. That the woodlot will in the future, at least as soon as the fruits of rational management are available, be an ever increasing factor in the production of saw timber

[1] Abstract of the 12th census, 1900, p. 285.

there can be no doubt. The nearness to the points of consumption, together with the practicability of an intensity of management that can hardly be hoped for on the larger tracts, gives it a tremendous advantage that the cheapness of the wild land can only in part offset. It is not unlikely, however, that a very large proportion of the woodlot area will, in the future as in the past, be managed as an adjunct to the general agricultural work of the farm rather than as a special crop for the market. The farmer will grow his own posts, his own logs for building purposes, together with more or less for the market; and the material cut in the early thinnings, the tops, and the branchwood will furnish his fuel.

The value of the woodlot as a source of fuel has recently been brought very prominently to the notice of the public generally by a realization that it is the only buffer that stands between the people and the higher prices which the coal combine may ask the moment they have the field to themselves. The people have also a fresh recollection of the fact that the woodlot is the only thing that stands between them and actual suffering by cold in the event of a coal strike. The cities and villages are more interested in this matter than the farmers themselves, for if the farmer has only a small supply of wood he will naturally provide for the comfort of his own family before he offers any for sale. A consideration of this should lead the urban population to heartily support a moderate and equitable tax rate for the farmers' woodlots.

I have said that the Bureau of Forestry is interested in the farmers' woodlot because it is the duty of the government to educate the people, because the country needed the woodlots' product, and because the woodlot itself needs better attention. In regard to this third proposition I shall speak only of the Michigan woodlot, which I may add, is no exception to the general rule in regard to the need of better attention.

The average Michigan farm is small, containing but eighty-six acres. Of this area fifty-eight acres are improved and twenty-eight unimproved. Of the latter, fully twenty-five acres are capable of timber production. This gives the 200,000 Michigan farms a total woodlot area of 5,000,000 acres. The present product of this area, as already stated, is $7,530,000, or about $1.50 per acre. Under proper management there is no reason why this product should not be doubled and the woodlots meanwhile be improved every year, instead of deteriorating, as they undoubtedly have been during the last ten or twenty years. It may be remarked in passing that the present yield of the woodlots of the State greatly exceeds the combined products of the orchard, grapery, and small fruit garden, which, together give a total of but $5,860,000.

In closing I shall briefly discuss the four chief faults I have so far found to be of very general occurrence in the woodlots of this State. The first I shall mention is the location of the woodlot. This cannot of course be remedied except as new areas are planted. A portion of the woodlot on every farm should be so located that it would break the force of the winter winds that otherwise would strike the dwelling house and the stables and make things generally uncomfortable about the dooryard and barnyard. This is far from being a matter of comfort only. It would mean less coal for heating the house and less food to keep the stock. A windbreak for the orchard is only of less importance to that above mentioned, and a windbreak for the farm is worthy of the most careful thought when planting on a large scale is contemplated.

One of the most serious mistakes in woodlot management has been the pasturing of stock within its limits. The injury done may be great or little according to the severity of the grazing, the topography and the soil, the character of the stand, and the condition of the margin (open or close). To be very brief, grazing is injurious in two ways:

1. It directly destroys the reproduction, and
2. It indirectly lessens the supply of moisture in the soil.

In regard to the first it is evident that with no regeneration of the timber trees to take the place of those removed it is merely a matter of time when the end must come, and the time when the stand will be too open may be very soon at hand. The evil effect of this open condition on the remaining stand will be discussed below. The effectiveness of grazing in destroying reproduction will depend naturally on the severity of the grazing, or, in other words, on the number and kind of stock in the woods. Goats are of course the most destructive, having a proverbial fondness for the terminal buds. Next must be placed the fine-wooled sheep, then coarse-wooled sheep, next horses and least destructive the cattle.

The injury to the moisture supply of the soil by grazing is largely due to the unchecked sweep of the winds through the woodlot in the absence of any undergrowth. The loss of moisture is due to direct evaporation and to the blowing of the fallen leaves, which should form a natural mulch over all the surface of the soil, into heaps or entirely out of the lot. The absence of this leaf cover also permits a more vigorous growth of moisture-robbing grasses on the forest floor. The treading of the stock is also more or less destructive to the leaf mulch, and firms the upper layers of the soil, thereby increasing the surface run-off during heavy summer showers.

Closely related to the injury done by grazing is the condition of the margins of the lot which are exposed to the prevailing dry summer winds, viz., the west and south margins. If these margins are protected by a band of evergreens or even a heavy growth of low broad-leaved trees the injury done to the soil moisture by grazing will be greatly reduced, and *vice versa*, if the margins lie open the drying out of the soil will be greatly increased. The open margin is a very serious defect of the average Michigan woodlot.

The fourth defect that I shall mention which is of very general occurrence is the too open condition of the average woodlot stand. In most cases this has been the direct result of the axe aided by grazing. In some cases it has been the result of a misguided effort to improve the woodlot, and in not a few cases it has been gradually brought about by the simple removal of the trees as they died—a result of depleted soil moisture from one or more of the many causes that bring this about. Whatever the cause, the results are disastrous. The striking of the sunlight directly on the forest soil stimulates the growth of grasses and other moisture robbing herbs on the forest floor; it oxidizes the humus in the soil thereby reducing its capacity to retain moisture, and it raises the soil temperature, increasing the direct evaporation from the soil. The influence of the light on the lower part of the crowns of the trees stimulates an abnormal development of leaves and branches in that region, often causing the so-called "water-sprouts" to develop from the trunk itself. These all tend to rob the top of the tree of needed moisture, and

some day during an unusually dry time the conditions become so unfavorable that the top dies, and the tree is fairly started on the downward course at a time that it should be in its prime.

Perhaps enough has been said to establish my thesis that the woodlot needs better care and a more extended discussion of its ills, such as injury by fire and by insects, the presence of weed trees and of "wolf" trees, etc., together with the remedial measures that may be practiced must be deferred till another time.

BEEKEEPING AND HORTICULTURE.

Friday Forenoon.

The sessions of Friday forenoon and afternoon were joint meetings with the Michigan Beekeepers' Association and the State Horticultural Society. The morning session was called to order by W. Z. Hutchinson, Flint, president of the Michigan Beekeepers' Association, who, after brief introductory remarks regarding the interdependence of beekeepers and fruit growers, called C. E. Hadsell, of Troy, vice president of the State Horticultural Society, to the chair and then read the following paper:

SPECIALTY VERSUS MIXED BEEKEEPING.

BY W. Z. HUTCHINSON, FLINT, MICH.

Time was when many of the industries were represented in one family. Flax and wool were grown, spun and made into cloth and worked up into clothing. Cows were kept and cheese as well as butter made for home use. Poultry and a few stocks of bees added to the comforts of the household. But there is no need of going into detail; everyone knows how people lived 100 years ago. Cheap and rapid transportation has encouraged the invention of machinery, the building of factories, and the classification of labor. This has brought about specialties. No one disputes that this condition of things is better. By it our comforts are more than trebled. Some industries branch out as specialties much sooner than others. Beekeeping was among the later ones. At last, however, it has become recognized as an industry itself.

At present, however, there are farmers who are keeping a few bees, perhaps a good many bees and apiarists who are managing small farms, perhaps large ones; there are men engaged in some other occupation who are thinking of taking up beekeeping, or may have already done

so; and there are beekeepers asking "what will best mix with beekeeping?"

I have little faith in that old saw about "not having all of the eggs in one basket." I say yes, have them all in one basket, and then carry that basket so skilfully that none are broken. I know there are trying seasons for specialists in any branch of business; times when it might be better, in that particular year, if there were more than one egg-basket, but the specialist does enough better, in the good years, to bring specialty out at the head in the long run. The specialist can have the best tools, appliances, and labor-saving implements, things that the dabbler cannot afford. He can do and have many things in a wholesale way that would be unprofitable upon a small scale. Upon this point Mr. R. L. Taylor, of Lapeer, Mich., once wrote: "A multiplicity of occupations multiplies the burdens of responsibility, induces unrest and embarrassment, and our powers become overtaxed, carelessness, slovenliness, unthrift and failure result. A jack of all trades is almost a synonym of a ne'er-do-well. What reason is there for dulling the edge of skill, and sacrificing thoroughness, by combining another business with that of beekeeping? Not certainly to fill up time. Beekeeping as a specialty is no small business. It is capable of great expansion. It can well furnish work for every day in the year, and the larger the business the smaller the proportional expense of the plant and the management, and consequently the larger profits. If beekeeping is so unprofitable as a specialty that the operator must pursue another business to eke out a living, then it is too unprofitable to be pursued at all, and should be abandoned altogether. If it can not be made profitable as a specialty with all the advantage that specialty brings, then it can not be made profitable as a subsidiary pursuit. We see this demonstrated in practice. It is not the specialist, but the *non*-specialist that fails.

Many professional men take up beekeeping as a pastime. With them I can not have any more argument than with the beekeeper who studies music for pleasure. But upon a money basis it is a far different thing. When a man is engaged in some pursuit that is capable of absorbing all of his energy and capital, I doubt if he can add to his pleasure or his pocketbook by adding some other business to his regular occupation. The beekeeping specialist, with his hundreds of colonies, his improved hives, appliances and methods, can and does produce honey more cheaply than the man with a few colonies. By specialty is not meant that a man does nothing else, but that it is his main business.

It is true that there are industries in which there is a mutual advantage in their combination. The fattening of hogs and the running of a grist mill, or of a slaughter house, is an example. The keeping of swine and the raising of apples also brings about a mutual advantage. The swine enrich and cultivate the soil, and eat the wormy apples that fall. This is good for the trees, and the apples are good for the hogs. There is no business that can be united with beekeeping to any great mutual advantage. There is a slight mutual advantage in the keeping of bees and the raising of fruit, except the small fruits that must be picked when the bees are swarming. There is also some advantage in the raising of alsike clover, or of buckwheat, but not sufficient to warrant a beekeeper in buying a farm, or a fruit grower to run an apiary.

I hope no one will imagine that I am advising beekeeping as a specialty

without previous experience. How this experience shall be acquired, although an interesting topic, is not the one under discussion. I might say, however, that nearly all of our beekeeping specialists acquired this knowledge by beginning in a small way in connection with some other pursuit. They are better fitted for beekeeping, and, at last, the old business was dropped for the new. Some of our specialists learned their business by an apprenticeship to some successful beekeeper, which is the quickest and best method.

Let us suppose that the highest success is attainable only by specialty. Having done this, we must not forget that there are "many men of many minds," that "circumstances alter cases," and that all men and all cases are not fitted for specialty. Some men prefer to lessen the risk of total failure by having the eggs in more than one basket, even if it makes costly eggs. A man with a small farm may have time to care for a few bees, or a farmer may have sons or daughters who can do a large share of the work. The reasons why a man sometimes desires, or is compelled, to mix something else with bees are too varied for mention here. It is evident that the greatest success can be hoped for only with specialty, yet no cut and dried, cast-iron rules can be laid down. A man must study himself, his surroundings, and the conditions of his particular case.

It is evident that those occupations will best mix with beekeeping that can be followed in the winter; or at least those requiring little or no attention during the busy season with the bees. What would be best for one man would be poor business for another. Among the vocations that have been mentioned are wood-chopping, teaching district school in the winter, or teaching singing school or writing school, raising grapes or apples, or other fall fruits, keeping Jerseys and making winter butter, canvassing, broom-making, etc.

Discussion of Beekeeping as a specialty, by E. B. Tyrrell, Davison.

Mr. Tyrrell said in part: "If a man cannot make a living out of any one business without something to bolster it up he is in the wrong business. There will be years of more or less complete failure, but the increased income of the good years will more than make it up.

There have been three stages in beekeeping: (1) The time of the box hive; (2) when movable combs came into use; (3) the present period of extensive beekeeping. The modern beekeeper must produce honey by the ton to make a success.

Beekeeping as a specialty is not a narrow occupation for it has many different phases such as queen breeding, wax production, comb-honey production and extracted-honey production.

BEES AND FRUIT.

BY PROFESSOR U. P. HEDRICK, AGRICULTURAL COLLEGE.

"How doth the little busy bee improve each shining hour," is not only a matter for the poet, the moralist and the beekeeper, but one as well for the fruit grower. Indeed, I am not sure but that it is a matter of more import to the fruit grower than to any one else. Providence has allotted the bee a task in gathering pollen all the day to fertilize each flower, if you allow such a parody on good John Watts, which man cannot perform and which is illy performed by any other means.

The fruit grower who complains of bees is an ungrateful wretch. At best fair exchange is no robbery, but the bees take nothing. A crop of honey removes no fertility from the soil, no substance nor flavor from the fruit, not even the fragrance from the flower. Multitudes of bees may store their hives with "choicely culled sweets" from your orchard and you may take it and feast yourself on the apple-blossom-flavored honey, or you may sell it for dollars and cents, yet neither your trees nor your farm is the loser by one penny's worth. If the bees take a little toll from the fruit, what of it? Should they not be repaid for officiating at the nuptials of your fruit blossoms? But do they take toll?

DO BEES INJURE FRUIT?

Do bees injure fruit? Perhaps you have heard the story of the woman who went in quest of her husband who was supposed to be taking a bath. At the door of the bathroom she called him by the endearing term "honey" and thrice repeated "honey! honey! honey!" The bather happened not to be the husband, but a man-servant who evidently had never been "honeyed" and did not understand the call. He answered, "This ain't no beehive, it's a bath room." Now I am not a beekeeper, but a pedagogue, and scarcely know a beehive from a bath room, and positively do not know from observation whether bees injure fruit or not, but I can give quotations from several good authorities on the subject which settles the question in my mind.

Prof. C. V. Riley, late chief of the division of entomology in the United States Department of Agriculture, says, in summing up the results of a series of investigations on this subject: "The experiments show conclusively that bees do not injure fruit at first hand and this fact is in keeping with the structure of the mandibles as compared with those of the wasps, which generally do the injury."

Prof. A. S. Packard, author of several standard text books on entomology, speaking of the disease "apiphobia," says: "This disease, apiphobia as many call it, has affected mankind before. Among some of its attending symptoms are intense bigotry (sometimes leading to much persecution), and an unreasoning credulity, so that all sorts of horrible stories regarding these entomological monsters are eagerly believed. A little knowledge of natural history is really the only antidote yet discovered against this disease."

Again, Prof. W. W. Bailey, of Brown University, says: "That bees work on over-ripe or bruised peaches, pears, raspberries and grapes when no honey can be found is admitted. Where such fruit is of value, can be saved and dried or canned, there might be some loss if left exposed where there are large numbers of both wasps and bees near. The housewife saves apples from further decay for a time by cutting out the soft spots; may not bees do the same in some cases by removing the free juice from the soft and bruised parts of the fruit?"

BEES OFTEN SLANDERED.

I have quoted these men because they were not financially interested in either bees or fruit and are supposed to be unbiased seekers after truth. Much more evidence of the same character might be given to prove that the bee is not a thief. Indeed, on several occasions the bee has been tried in the courts for stealing fruit and so far as I know has invariably been acquitted. I must conclude for myself, after reading the literature very carefully, that it is slander pure and simple to say that bees injure fruit.

Fruit growers attacked with apiphobia not only slander the bee, but the beekeeper, like other good people, is not infrequently slandered. It is claimed, so the statement goes in a case in court of which I read, that the beekeeper was willfully negligent and should be liable for the injury his bees had done. But as I understand it, fruit juice is a source of disease to bees, and if any quantity is secured the colony is likely to be lost in the winter. Thus the beekeeper is sued for damages, and at the same time stands liable to lose his bees from colic brought on by eating the fruit grower's rotten fruit. Truly the beekeeper is, to use a pun of Hood's, "an unfortunate beeing."

But the fruit grower is not always the complainant in the law cases. The beekeeper has been known to take his troubles to the courts. On several occasions the strong arm of the law has been felt by the fruit grower who had been guilty only of spraying his plants a little after blossoms had appeared. As a fruit grower I appeal to you beekeepers: "Is it not enough that we furnish you free pasturage for your winged stock? Do you realize that we cannot exclude your greedy, stinging property from our orchards? We cannot forbid them the boundary line, nor impound the trespassers, nor fence them out, and no action for trespass can be brought against you. Come now, is it fair to drag us into the courts should winds and rains delay our spraying a little into the blossoming time? Why should we, friend beekeeper, whose interests overlap, go to law? Let us recognize our mutual dependence. What we fruit growers and you beekeepers need, instead of courts, is good neighborship. Instead of invoking temporal laws, let us try those which the psalmist tells us "are sweeter than the honey and the honeycomb," and in the keeping of which "there is great reward."

SPRAYED BLOSSOMS DANGEROUS.

It should be said in passing that there is no doubt but that bees are killed in collecting honey from blossoms that have been sprayed. For a long while there was little but hearsay on the subject, but several experiments within the past decade have proved conclusively that bees are

liable to be poisoned by the sprayed blossoms of fruit trees. The liability increases, as a matter of course, in proportion as the weather is favorable for the working of the bees. The danger begins as soon as blossoms appear and lasts until all have fallen.

But why all this fuss about spraying when trees are in bloom? What right-minded fruit grower ever thinks of spraying his trees at blooming time? Experience and direct experiments, as every up-to-date horticulturist knows, have proved that the fruit crop is decidedly injured by such spraying. The pollen is weakened or killed and the stigmas injured. Moreover, there is no reason for spraying at this time unless it is to thin the crop, for all known troubles can be better treated before or after blooming time. I, therefore, look upon the law forbidding the spraying of trees in bloom as nonsensical. The law does more harm than good, if there be such, a good way of killing his neighbor's bees.

The bee flits from flower to flower, takes something for herself, but leaves quite as much for the next comer. Her motto seems to be, "Live and let live." Take a lesson, beekeeper. Take a lesson, fruit grower. "Live and let live" be your motto, and we shall hear less of this nonsense about bees eating fruit and spray killing bees. A bee among the flowers in spring, says an old writer, is one of the cheerfulest objects that can be looked upon. Its life appears to be all enjoyment—so busy and so pleased. How about the bee as an exemplar for man? "So busy and so pleased," a second motto to keep us out of the courts.

WRONGS THAT BEES DO.

I would gladly pass on and say nothing of the wrong-doing which I believe the bee is really guilty of, but I am compelled to show up the relations of bees to fruit growing just as they are. Among all the things that poets have said and sung about bees, I do not remember their ever having mentioned the fact that the bee not infrequently scatters evil.

Our friend the beekeeper, in telling us of the remarkable number of products—honey, wax, bee-bread and bee-gum—collected and carried by bees, never mentioned the fact that the liquid nectar of their honey bags may contain vile germs. Or more likely it is the waxen thigh, the velvet cap or the humming wing, that rubs against and carries away the evil. At any rate it is well established that bees carry germs at least of one disease from tree to tree, namely, the pear blight, and in sufficient quantities to be a means of spreading the disease. But what shall we fruit growers do about it? Even if no bees, no blight, were true; no bees, no fruit would be just as true. Under the circumstances, it seems to me the best we can do is to take the evil with the good and say nothing.

We have not yet sufficiently touched upon the chief good work of the bee; this we must hasten to do and so acknowledge the debt due her from the fruit grower. That the bee is a worthy partner in fruit growing and helps to load the trees with fruit has long been known; the ancients, seemingly, having given the bee more credit for her good work in the orchard than we moderns do.

FRUIT GROWERS' FRIENDS.

"Sweet is the hum of the bee
That at her flowery work doth sing"

was much to Virgil and Pliny, who wrote poetry and books, kept bees and grew fruits long, long years ago. When it was discovered nearly two centuries ago that flowers had sex, the naturalist of the time held that honey was but the bait by which bees were induced to take the fertilizing element and carry it from flower to flower. They were right only they knew not the whole truth, for we now know that while pollen may be distributed by them and other insects, the fruits are almost wholly dependent upon visits of the bees, though we must include here wild bees, bumble bees and the bee family in general.

Every fruit grower now knows that the fruitfulness of his orchard is largely influenced by the abundance or scarcity of bees, and if the weather is such that bees cannot work but little fruit sets. That orchards in which bee hives are kept bear larger crops than those not thus favored is common knowledge. No matter how carefully the strawberry grower arranges his rows of perfect and imperfect varieties, his crop would be small were it not for the timely help that he knows not of from the bees. We fruit growers should give the bee due credit as a fruit producer and must never begrudge the nectar and pollen the bee takes as her professional fee as a midwife.

The bee does other work for the fruit grower that we must not lose sight of. New varieties come from crossed plants. It is the fashion now for the plant breeder to do his own cross pollination, but most of our new varieties still come by chance and the bee cross-pollinates 10,000 flowers where man does one. Most of our new varieties then are not man-made varieties, nor chance-made varieties, but are bee-made varieties. Thus the plant breeder owes much to the blessed bee.

NATURE'S PROVISIONS.

The fruit grower has come to recognize the great good he derives from the principle so strongly set forth by Charles Darwin, that close-breeding tends to sterility and debility, while cross-breeding among different individuals and varieties among the same species avoids this tendency. This brings us to the matter of cross-pollination, which we now know to be all-important in fruit growing. Here again we have an all-wise and beautiful provision of nature whereby the wonderful adaptation of bees and flowers for cross-pollination benefit the fruit grower.

Waite, of Washington, has proved that many pears and apples must be cross-pollinated to produce crops of fruits. Beach, of Geneva, found that some grapes need cross-pollination. Bailey and Waugh state that many plums are not self-fertile. All give the same remedy, namely, mixed planting by means of which foreign pollen is supplied to the impotent varieties, but none seemed to have recognized the importance of the bee in this exchange of pollen. Now while the bee is little among such as fly, let us not entirely overlook her in this matter of cross-pollination and to give as the remedy for infertile orchards mixed planting and plenty of bees.

The bee not only befriends the fruit grower, but the gardener as well. She is the same sort of a match-maker and matrimonial agent for the

cucumber, squash and their kind; the tomato, egg-plant and not a few other vegetables that she is for the apple, grape, strawberry and fruits in general. Truly, few of us recognize the good work, and the amount of it, that the bee does for us, and at small cost, too. Suppose a hired man or the kitchen maid had to undertake the dry-nursing or cross-pollinating of the cucumbers and tomatoes? Wages for hired help would go up and so would the price of vegetables.

BEES IN THE GREENHOUSE.

Much has been written about the value of bees in the greenhouse in the growing of forced vegetables and fruits. My own experience with the bee as a worker indoors has not been satisfactory. In one of the western states I tried a hive in midwinter in a house of cucumbers. But they would not work, and flew at the glass and out of the ventilators into the cold, where they perished. From my experience I conclude that the bee was of small account in a greenhouse, that she was nothing but a humbug in the winter time. Others have had similar experience, and from all that I can gather I conclude that the bee must be tamed and domesticated and be made to give up her wild ways before she is of much use indoors. I must remark,too, that I found the bee very testy and ill-tempered in the hot air of the greenhouse. I would not say that this is her nature, but that, like the best tempered of people, there are times and seasons when she is very put out.

BEE NOT EXAMPLE FOR MAN.

I must come now to the end of my paper, which is somewhat rambling and fragmentary, and for the all too obvious reason, I fear, that I can get but little out of my subject. I had hoped to piece my paper out by summarizing in the way of drawing lessons for my fruit-growing friends from the prudence and industry of the bee. (I take it for granted that beekeepers have learned these lessons from the bees). But my father-in-law, who is a preacher, tells me not to do it because the good book draws no such lessons and he tells me that the Bible never once sets the bee as the pattern for man. He thinks that few, unless it be the very young or the simple-minded, need have the storing and hoarding of the bee impressed upon them. Too often these are vices rather than virtues. The ant, to whom the good book refers us, wisely provides for its daily fare, but does not store up even beyond its capacity to feast and gluttonize as does the bee.

But if I leave the Bible and go to my little girl's story book I can draw at least one lesson for all of you. The story goes that one season in a village in Germany the place was overstocked with bees. With one exception the hives were poorly filled. An old man, no wiser than his neighbors, whose cottage was no nearer the bee pasturage, whose garden had no more flowers, had his hives filled with honey. He was accused of having bewitched his neighbors' bees. He bore the accusations patiently until the end of the season, when he called his neighbors into his bee garden and pointed to his hives. "This," he said, "is the only witchcraft I have used." The hives were inclined a few more degrees to the east and to the sun than were his neighbors. His bees were up and stirring before

his neighbors' honey-gatherers had roused themselves. The early bird had caught the worm. The lesson to you, my friends, is that your bedroom windows should always, if possible, face the east.

DISCUSSION OF BEES AND FRUIT.

BY GEORGE E. ROWE, OF GRAND RAPIDS, MICH.

A fruit grower or farmer who has pasture for bees has just as much right to keep bees as a bee specialist.

In speaking of the benefit of bees to the fruit grower he said: "If I did not get a pound of honey I would not be without twelve or fifteen colonies of bees for their beneficial effect in fertilizing the strawberry and other fruits.

"I have sprayed my orchard when the trees were in bloom and found but few more dead bees than when I did not spray. Apples bloom at about the same time that the old bees die any way, and it is largely these dead old bees that we see at that time. I think the damaging effect on bees of spraying while the trees are in blossom is greatly overdrawn.

"I would no more be without bees than I would neglect to cultivate or fertilize my orchard, because of their beneficial effects, to say nothing of the honey question."

Further discussion brought out the fact that bees will travel four miles with profit if there is no pasture nearer.

SMALL FRUITS FOR HOME USE AND MARKET.

BY W. W. FARNSWORTH, PRESIDENT OF THE OHIO STATE HORTICULTURAL SOCIETY.

A few years ago a speaker might have felt it advisable and necessary to introduce this topic with a plea for the more general use of small fruits by the farmer and his family. That plea is surely unnecessary here, and most farmers must realize that the free and judicious use of these luscious necessities provides a healthier body, a clearer and more active and efficient brain, hence greater capabilities for success and happiness.

We are coming to realize that the farmer has to feed and clothe the nation, to preserve the balance of trade in our favor in our commerce with other nations, and to supply most of the great and successful men of our country; hence we believe the farmer will do well to select a site near his residence, from reason of convenience, and on the small area needed for his purpose can fit it by drainage and the liberal application of well rotted manure, or better yet, by coarse manure applied the year before and rotted in the soil.

The commercial grower, needing a larger acreage, will select a soil already fitted for the purpose as nearly as possible.

Perhaps the best example which can be given of the ideal soil is a piece of newly cleared soil of a sandy loam nature, minus roots and stumps. On such soils I have grown my best crops of strawberries without applying any fertilizer whatever. Such soils not being often available, let us copy nature as nearly as possible.

PREPARATION OF SOIL.

A clover sod with as much of the tops as possible, covered with stable manure, applied as soon as possible after removing the hay crop, and plowed in the late fall or winter, is a good preparation. If the sod has stood long, or if there is danger from the white grub, it may be safer to grow a crop of potatoes before planting the strawberries, but I prefer if possible to plant on a clover sod of one year standing, that the berries may have the first chance at this store of humus and fertility.

I believe late fall or winter plowing enables the plants to withstand the drouth better the first season. The soil must be made fine, firm and compact, but do not roll when wet. Dig plants from a bed set last spring, which, of course, has never borne fruit to exhaust it. Do not dig on a cold, windy day, and as fast as a handful of plants are dug, cut the roots off to four inches, and pack in a box to keep moist till planting, which should be as soon as possible after digging.

In transplanting, try to return the plant as nearly as possible to the conditions in which it stood before digging, with crown just at the surface of ground and the soil packed firmly about the roots. Begin cultivating at once to prevent the waste of the moisture so absolutely essential to the growth of plant and fruit. Cut off blossom stems as they appear. Remember we must build up strong, vigorous plants the first season, if we expect a full crop the second season. The small plant in about a month from the time of blooming produces and ripens a weight of fruit many times as heavy as the plant itself. In order to do this to the best possible advantage, the soil must be in such favorable mechanical condition that food and moisture can be taken up by the plant, readily and rapidly. In fact, I consider a soil of average fertility, and good mechanical condition, more favorable for the growth of berries, and especially the strawberry, than is a very fertile soil which is hard and heavy.

STRAWBERRY CULTIVATION.

Cultivation and hoeing should be frequent enough to preserve a continuous earth mulch, and destroy all weeds. Occasionally during the summer, we go through the patch after a rain and place runners where wanted, taking special care to fill vacancies. My ideal row is one of about three plants abreast, seven or eight inches apart, making a row 16 inches wide with the plants about six inches apart in the row. In practice we do not approach this with any degree of uniformity.

One thing is certain, however, and that is that we must restrict the plants of many of our best varieties, in order to secure the best results. Our method of doing this is as follows: When the runners are growing and plants forming we are careful not to throw them around onto the row too much, by too close cultivation. When enough plants have formed, put the rolling cutter on the cultivator, and cut off the surplus which run

out into the spaces between the rows. These are easily disposed of, but those which run lengthwise of the row present a harder proposition.

We use a common hoe with the sides cut off, leaving it about three and one-half inches wide, and with this shave a narrow strip crosswise the row, and then leave a strip of about equal width. This tool in the hands of a careful man seems to be the most satisfactory method I have ever tried. It not only removes the superfluous plants, but throws the runners and half-rooted plants out into the spaces where the rolling cutter will destroy them. Do this as early in the season as you can secure the requisite number of plants, so that those that are left may have the advantage of the increased space as long as possible to fit themselves for next season's labors.

MULCHING: ADVANTAGES AND DISADVANTAGES.

The next question that presents itself is that of mulching. There are advantages and disadvantages connected with it. The advantages are: Mulch protects the plants from freezing and thawing and in some soils from "heaving" also. It preserves moisture during the ripening season and keeps the berries clean. In its decay it adds humus to the soil.

The disadvantages are, first, the cost of application; second, greater danger of frost at blooming; third, later ripening of fruit, and also danger of introducing grass and weeds. Sum up the pros and cons and decide for yourself whether or not to mulch. Much will depend on your soil, and whether you are in special danger from spring frost, or drouth, or whether your market pays best for the early berry or the late one.

If you are growing only for home use, the rest of your labors in the strawberry patch are easy, but with the commercial grower the harvesting and care calls for more care and judgment and push, and offers more annoyances than does the growing. Experience, foresight, judgment, patience and honesty are required and the only safe way is to begin on a small scale and grow into the business. Visit the market occasionally and see how your fruit looks at the other end of the route, and also see how your competitors' shipments look, and study wherein you can improve.

Deal fairly with the commission merchant, grocer or private consumer who buys your fruit. Try to arrange for a succession of small fruits to give continuous employment to your best pickers.

We usually pick but one year, and then plow under and sow to clover, or plant to potatoes, according to the fertility of the soil. I think it is as cheap usually to grow a new bed as to properly clean and care for an old one, and the first crop is usually the best, especially with the more productive varieties.

OTHER SMALL FRUITS.

So much for the strawberry; now let us consider very briefly the other small fruits. There are three successful periods for transplanting the blackcap raspberry. The first is in late autumn and the plants should be mulched to protect them the first winter. I would not advise this practice on heavy soil. The next period is the one most generally chosen, which is in early spring, as soon as the ground is fit, and before young shoots have started. The third is after the young shoots have grown four or five inches. They can be moved short distances very successfully at this time. Plant them in furrows four to five inches deep, the furrows six to

eight feet apart, and the plants about two and one-half feet apart in the row. Cover the plant about two inches deep and allow the furrow to fill gradually during the season.

In commercial planting it will be an advantage if the rows run east and west, as the west wind is not as liable to blow down the canes. Red raspberries and blackberries are planted in much the same manner as the blackcaps.

One of the greatest obstacles to success in the cutlivation of red raspberries is in their tendency to produce too many plants, especially when the roots are torn by too deep cultivation. I do not want over 25 plants to the rod and treat all others as weeds, which they are, inasmuch as they are plants out of place. Cut them off with a hoe when only a few inches high. Cut out and burn all bearing wood, as soon as possible after the crop is off.

Currants and gooseberries are planted in the same manner as raspberries, but on account of their starting to grow early in the season, should be planted in fall, or very early in the spring. I prefer one-year-old currants and cut back severely so as to start half a dozen shoots from near the ground, then after a couple of full crops, you can cut out one-third of the old wood annually, and allow enough young wood to grow up to take its place. If the borer is troublesome, you will find the bush form much better than the tree.

The currant and gooseberry require heavy soil and high feeding for best results.

BEGIN WORK EARLY.

Let us offer a suggestion for those who desire to grow for home use only, and feel that they cannot spare the time from their field crops. Before the rush of spring work comes on haul into the berry patch a plentiful supply of straw, corn fodder or coarse manure, and spread it all over the ground among the raspberries, blackberries currants and gooseberries, so thickly that it will keep down weeds and retain moisture, and you will not need to leave the team in the stable while the sulky cultivator stands in the fence corner, and the weeds are growing in the corn, as you wield the hoe in the berry patch.

The pruning can also be mostly done during the winter, and I believe there are but few farmers so situated that they are justified in neglecting to supply their families with an abundance of freshly gathered small fruits in season.

SMALL FRUITS FOR HOME USE AND FOR MARKET.

BY C. B. COOK, OWOSSO.

Small fruits should play an important part in the home garden. If carefully grown, a comparatively small number of plants will furnish an abundance of the small fruits for an ordinary family. By rowing all vines carefully, both ways, nearly all of the routine work can be done with a horse and cultivator, thus reducing to a minimum the necessary

labor. But few varieties of each kind of fruit need be planted. For strawberries, Senator Dunlap and Warfield make a good pair, with a few Brandywine, Sample or Gandy for late berries. Raspberries and blackberries also are fruits that once appreciated are always favorites. Among the red raspberries Cuthbert, Golden Queen, and for black, Cumberland, Gregg or Kansas, are leading sorts. A half dozen hills of Columbian should also be added for variety. Any hardy blackberry makes a valuable addition. The Snyder, Taylor or Mersereau are leading kinds for home use. Currants and gooseberries must also have a little space, while grapevines enough to supply a family fond of this royal fruit will require more room. Under favorable conditions a dozen plants of Delaware, Worden and Concord will furnish a very satisfactory supply of fruit and pay in comfort many times their cost of production. In growing fruits for market the question assumes different proportions. The matter of elevation, soils and adaptability of fruit grown and other local conditions are of prime importance. Also in dealing with a home market the methods must differ from those employed for the distant market. It is easier for the average fruit grower to raise fruit than to handle it to the best advantage after it is ready to harvest. Fruit must be sold at a profit or we are disappointed.

We must know as far as possible the market demands, and supply such demands to the best of our ability. Fruit statistics for the last dozen years show conclusively that the demand for fruits of all kinds is increasing many fold faster than the population. People that can get just the quality of fruit desired increase their consumption rapidly. We are a nation of meat-eaters, but where satisfactory fruits are abundant the meat and doctor's bills are greatly diminished to the marked advantage of the consumer and fruit grower.

We must study every phase of the subject thoroughly and carefully look to business methods in every detail. There is too little thought given to the growing, packing and selling of small fruit to secure the best results. Fruit growers lose annually large sums of money through neglect and heedlessness. The small-fruit growers of Michigan are making one fatal mistake that we hope competition will ultimately rectify. The practice of putting second-class goods in first-class packages is altogether too common. In few other lines of work will the consumer endure one-fourth as much imposition as he will of the fruit man. The fruit grower looks to the immediate price and thinks he is ahead, while in the end he pays dearly for his dishonesty. There is a class of consumers for every grade of fruit grown, and if these grades and demands are carefully recognized the best grades will bring more dollars than all grades dishonestly sold. Thus a higher service will be rendered the people and more dignity will grace our profession. There is always a brisk demand for the best grades of fruit at remunerative prices. Close application to details and business principles must win out in the end. Absolute honesty, business methods and close attention to details are grossly neglected, yet are three essential requisites to success in commercial fruit growing.

HORTICULTURAL SESSION.

Friday Afternoon.

The chair was occupied by C. F. Hale, Shelby, president of the State Horticultural Society. The band of the State Industrial School for Boys was present and furnished several pieces of music which were encored. Miss Bertha Wellman was expected to furnish a recitation, but was unable to be present, and Mr. A. J. Anderson kindly responded with several selections.

THE APPLE ORCHARD AND ITS NEEDS.

BY A. P. GRAY, TRAVERSE CITY.

The essentials of profitable apple growing may be grouped under seven different heads: 1, thorough preparation of the soil before the trees are set; 2, selecting desirable varieties; 3, cultivation; 4, fertility; 5, pruning; 6, thinning; 7, spraying.

There has probably been more stress laid upon spraying during the last decade than upon all the others combined. This is just as it should have been, being the latest of them all, somewhat expensive, and rather disagreeable, and it was necessary to make it very emphatic until fruit growers became aroused to its importance. This has been pretty well accomplished, and now it would be well to bring the other essentials up with it, for there are more orchards suffering from starvation than from any other cause.

Tillage and fertility then would rank first in the list for the majority of orchards. Cultivate early and thoroughly until about the middle of July and secure a thrifty growth of some kind of cover crop after that date by a liberal use of fertilizers containing nitrogen for the cover crop, and phosphoric acid and potash for the fruit. The cover crop has a quadruple capacity of robbing the trees for the time being, thus checking their growth and causing early maturity of the new wood, and consequent safety from winter killing; holding the leaves and the snow, and supplying humus to the soil. When our cover crop becomes humus, it still has a triple capacity of making the soil loose and porous, it has a sponge-like quality of holding water, and finally adding fertility. This cover crop may be crimson clover, where protected by snow during the winter, or the mammoth variety anywhere, rye or oats. The objection to those crops that live through the winter is the temptation of letting them grow for a time in the spring, thereby losing the early cultivation necessary to an early growth and conserving moisture. We have had very satisfactory results by seeding the alternate strips to mammoth clover and cultivating

the others; at the end of two years the order is reversed, seeding those cultivated and cultivating those which had been in clover, using fertilizers if necessary to secure a strong growth of the clover. By this method but half the area is cultivated at any one time. The fertility is supplied at little expense, and a fair growth of the tree obtained at the same time.

To the fifth essential, or pruning, we would apply the rule of "pruning in summer for fruit and in winter for growth of tree," that is, when the tree is making its most vigorous growth, preferably in June, and when it is dormant. The former to be used upon vigorous growing and shy-bearing varieties only. Summer pruning checks the growth of the tree and the tendency is to form fruit buds instead, which is in accordance with a law of the vegetable kingdom, that when the life of a plant is seriously injured, the first effort of nature is to reproduce itself before it dies. Nature's object is to produce seed, not fruit. We see this law exemplified occasionally by a dying tree, blossoming and setting its fruit up to the last year of its life, dropping its fruit when the tree becomes exhausted and then dying.

Florists recognize this law by checking the growth of their flowering plants, when growing vigorously and do not blossom. The flowers they seek are nature's effort to produce seed. We depend upon sunshine and potash to color our fruit, and as the former is cheaper and much more easily applied, open heads, permitting the rays of the sun to reach most of the specimens, are desirable. If large branches are removed, paint all stubs more than inch in diameter.

The sixth essential, or thinning, is being practiced more than formerly and is one of the important elements to complete success. It is the growing of the seed of the apple and pear, the pit of the peach and the plum, that exhausts the soil, and the tree. The small specimens contain as many as the large ones and consequently are equally exhaustive; our aim, then, should be to produce more pulp and less seed.

The earlier the thinning is done the better, removing inferior fruits and leaving the specimens six or eight inches apart. At the last meeting of the State Horticultural Society there was abundant evidence of the great importance of thinning.

The seventh essential is spraying. As remarked at the outset, this subject has been very thoroughly taught and so recently that little can be added, especially since the very exhaustive article by Professor Taft in the National Fruit Grower. I would, however, offer a word of warning against changing the formula 4-4-50 to six pounds of copper sulphate, as occasionally recommended, as four pounds last season caused a roughness on the side of the apple receiving the direct force of the spray, but would increase the amount of lime to five pounds, changing the usual formula to 4-5-50. The first application before the buds open, with copper sulphate solution, for all fungous diseases, is perhaps the most important one and should not be neglected, making the second application with Bordeaux mixture within two weeks after the blossoms fall, if possible.

PEACHES AND HOW TO GROW THEM.

BY J. N. STEARNS, KALAMAZOO.

In the few minutes allotted to me I will give some of the points thirty-five years' experience have taught me are important in successful peach growing.

In the first place, select a suitable soil and location. Thousands of trees are being planted every year on soils not adapted to peach growing. I never have seen a successful peach orchard grown on soil that had to be underdrained.

SELECTION OF SORTS.

Great mistakes are being made in the selection of sorts. We learn of a particular variety that has proved of great profit to some one at a distance from us, we plant it largely and find that it is not adapted to our locality. The safest way is to cast about our own vicinity and find sorts that are in demand, succeed in our soils and climate. Of course good trees should be selected and planted on well fitted soil. Thorough cultivation should be given, but for the young orchards not in bearing, this cultivation should be discontinued in July and a cover crop sown which gives the trees ample time to mature the new growth to go into winter. For several years I have used oats for this cover crop and found it very satisfactory; they should be sown at the last cultivation in either young or bearing orchards. Most soils have fertility enough to properly grow the trees if well cultivated until they come into bearing.

PRUNING.

In planting, the ends of all roots should be pruned off and the tree pruned to a sharp whip and headed back to 2½ to 3 feet. The next spring the top should be formed, leaving only such branches as are needed for a permanent top. Each spring the tree should receive a careful pruning, heading back quite severely, especially on the east side of the tree to keep it well balanced. I am satisfied that we are leaving too much top on all our fruit trees for the best results, and if this is properly attended to each year, we may keep it in proper shape without severe shock to the tree.

SPRAYING.

This has become a necessity to successful peach growing to prevent curl-leaf. It is also a material help in preventing rot in the fruit. This spraying is a preventive, therefore it is of importance that it should be done in time. My experience is that it should be done before the sap starts, as I have seen this difference in sorts subject to curl-leaf, one row sprayed the last of March—full crop—one row sprayed the last of April —no fruit scarcely—same sort and rows side by side. This spraying should be very thorough from both sides. I use for this two pounds of sulphate of copper to fifty gallons of water.

THINNING.

This is very important with the peach. There is no fruit grown in this State that the people are more interested in than the peach. Why is it? It is its delicious flavor that everyone likes, so it should be the aim of the fruit grower to obtain this in its highest state and this cannot be with an overloaded tree; there is no fruit it pays so well to thoroughly thin as the peach. When the fruit is regularly set all over the tree it should be thinned to six inches and in some sorts eight is better.

CULTIVATION.

Cultivation in bearing orchards should be kept up, especially in dry seasons, as near to the harvesting of the fruit as possible, going over the orchard with a fine tooth harrow or weeder as often as once a week if possible, keeping a fine dust mulch on the surface to prevent the escape of moisture below.

FERTILIZERS.

This is a subject that is now attracting considerable attention in order to get growth and production, but I have given it much thought and study for many years for results in another direction, and that is, quality or flavor, beauty and firmness. I claim I can ship the same variety of peaches hundreds of miles further and have it arrive in good condition, where the soil has plenty of potash, than fruit grown on soils deficient in this element, and this is also true with the strawberry, this same element produces the highest flavor and beauty; so I use hardwood ashes as my main fertilizer, using just enough barnyard manure to keep up the proper growth of the tree.

MARKETING.

This is the one important thing in peach growing and the one hardest for the average peach grower to learn.

Discussion by R. D. Graham, Grand Rapids, on "Peaches and How to Grow Them."

Nine-tenths of the peaches grown in Michigan are grown by farmers who make no pretense of being horticulturists, yet Michigan peaches are the best grown. Peaches grow best on thin-surfaced land with a hard subsoil about Grand Rapids. The selection of varieties is largely a local question. Wood ashes are the best fertilizer for the peach orchard, all things considered. If you adopt any one method do it thoroughly. Almost any good method can be used with profit if it is thoroughly adhered to.

PLUMS AND CHERRIES FOR PROFIT.

BY L. J. POST, LOWELL.

Some thirty years ago, after carefully studying the matter, I concluded to plant a plum orchard and to place them in a hog yard. Sixty trees equally divided between the Lombard, Weaver and Wildgoose were ordered from a so-called reliable nursery, but every one of the trees turned out to be Lombard, for which fact I was very thankful. Knowing something of the habits of the hog, their noses were all carefully "rung" and three oak stakes were placed about the trees some eighteen inches away, around which two lines of barbed wires were fastened. As an additional protection, three large stones were placed at the roots of each tree, but these did not stay in place very long. After waiting for several years the trees blossomed and set a large crop of fruit. Of course, we had no idea of throwing it away by thinning, but placed a tall hop pole in the center of each tree and at a point several feet above the tree attached a strong cord, the other end of the cords being fastened to the loaded branches of the tree, thus supporting them in good shape. The crop was disposed of to a local dealer at $4.25 per bushel and as the trees averaged more than two bushels each, it was a very profitable crop. This orchard was near the highway, along which from 100 to 150 teams passed daily and probably two-thirds of the farmers who passed set plum trees in the hog yard the next spring, but in nearly every case reported that the hogs succeeded in rooting up every tree. The fate of this plum orchard is sad to relate, as either on account of the excessive cultivation, over-fertilization or exhaustion from the heavy crop, nearly all of the trees died the next winter.

Not discouraged, however, we planted another orchard of several hundred trees after studying catalogs in which each variety described was said to be a little better than the previous one, and of course we ordered trees of nearly everything. To say that the orchard presented a somewhat uneven appearance would be putting it mildly, as we planted Shropshire Damson, which seldom reaches a height of ten feet, next to Washington, which often grows thirty feet high, and the others were equally irregular. In this orchard Lombard and Shropshire Damson were the most profitable. Soon afterwards an orchard was planted which consisted mostly of Bradshaw, Gueii and Golden Drop, with a few Quackenboss, Shippers' Pride, Pond and Grand Duke. This orchard is in full bearing. Golden Drop has been my most profitable variety and Quackenboss about the poorest, although in many sections of the State the reverse is true. For my location the varieties would be Red June, Burbank, Bradshaw, Lombard, Gueii, Grand Duke, Monarch, Golden Drop and Shropshire Damson. One of our early plantings consisted of trees budded upon wild American plums. They bore several good crops, but as the roots were not strong enough to hold them erect, when bearing a full crop of fruit, it was necessary to support them by means of stakes.

The ground for a plum orchard should be thoroughly fitted and marked both ways fourteen or fifteen feet apart. Care should be taken to have

them perfectly straight. It will then be an easy matter to plant the trees in straight rows. If the ground is properly prepared there will be no occasion to dig a hole any larger than will be required to receive the roots. The orchard should have careful cultivation after this. We use one horse and plow the land early in the spring with a plow that can be adjusted to turn either to or from the trees. Set the plow so as to run quite shallow and so that it can be easily thrown out in passing a tree. Turn the furrows toward every alternate row of trees and go through the entire orchard, leaving a few furrows unfinished upon each land. Then set the plow so that the horse will be away from the trees and finish the furrows along the tree rows. By reversing this order the next year, turning the soil from the rows where it was turned away from them this year, the ground will be kept level. During the remainder of the season the land is worked once a week with a spring-tooth harrow and a Planet Jr. By lengthening the side arms so as to give room for one more tooth, a cultivator with nine teeth instead of seven will work a space of four feet wide. Whenever the weeds get so large as to trouble, a Planet Jr. cultivator with five scraper teeth about five inches wide was used. After each cultivation it is a good plan to go through the orchard with a sharp hoe and cut off any weeds that may have been left and at the same time remove any sprouts at the base of the trees. This cultivation should be kept up until about the first of August, or later if the season is dry, and then sow to oats or some other cover crop. A good horse will plow a five-acre orchard in two days and will cultivate it in a little more than half a day, and where the trees are so close there is less liability of injuring the trees than when two horses and larger tools are used.

Our present plum orchard is used as a hen park and as the hens will clean out everything in the way of a cover crop around their headquarters, we prevent this by dumping a load of rakings from the wheat or oat stubble in piles near their house when the cover crop is sown, and this keeps them busy until the crop is too large to be injured by them.

Although we spray the trees several times with Bordeaux mixture and Paris green, we generally find it advisable to jar the trees more or less for curculio. We prefer to do the pruning in the fall or early spring, cutting back the strong growing varieties severely and generally cutting out the strongest limbs and leaving the smallest ones, although some varieties require very little pruning. After the severe winter of 1899 the trees seemed badly injured, but where a large part of the top was removed they seemed to recover much better than where left unpruned. For feeding the trees we use stable manure, commercial fertilizers and ashes, and find that high manuring is especially necessary for the Golden Drop, which is inclined to drop badly if not well fed. No injury has been done from using wood ashes even when applied in large quantities. For shipping plums we consider the forty-pound, six-basket crate the best package for large plums. One season when the best price we could secure was 40c a bushel in bushel baskets we shipped them in forty-pound crates and received $1.75 per crate. The smaller varieties sell best in the 16-quart berry crate.

There are few sections in Michigan where it will be safe to invest very heavily in sweet cherries and the more profitable sour varieties are none of them new. No class of fruit trees exceeds the cherry in the loss in transferring from the nursery to the orchard. The safest way is to

purchase trees in the fall and heel them in quite deeply in a dry, sandy soil, where they will be somewhat protected from the wind. Many growers, however, prefer to obtain seedlings which usually cost $5.00 or $6.00 per thousand and grow their own trees. If properly cared for they can be budded in the early part of August. The Malaheb is hardier and in every way preferable to the Mazzard for both sweet and sour varieties. Care should be taken to secure mature buds or the result will be disappointing. The most profitable varieties are Early Richmond, Montmorency, English Morello and Wragg. The care should be much the same as for peaches except in the way of pruning, as a cherry requires but little after the head has been formed. Cherries should never be picked wet if it can be avoided, and in case of a wet, muggy time when the cherries begin to ripen, there is danger of losing the entire crop unless they are picked a little green.

In answer to questions during the discussion of Mr. Post's paper on "Profit from Plums and Cherries," Mr. Post replied:

A cherry orchard should be cultivated the same as a peach orchard. I mix my Bordeaux mixture as follows:

3 pounds Copper Sulphate,
5 pounds lime,
50 gallons of water.

I have better success when I use an excess of lime.

Mr. Benton Gebbart of Hart recommended the following varieties of plums: Gueii, Coe's Golden Drop, Black Diamond, Grand Duke, Burbank and Red June.

Hale and October Purple are excellent new plums.

RURAL SCHOOLS.

Friday evening.

President J. L. Snyder presided at the closing session of the Institute, which was devoted to the subject of Rural Schools and Gardens. At the opening of the meeting, the College cadet band gave a concert and later on in the program the M. A. C. chorus rendered "The Heavens are Telling," from Haydn's Creation. Both of the addresses were illustrated by stereopticon views. Those shown by Mr. Crosby had been taken in various parts of the country and gave a good idea of what can be, and is done by means of school gardens for the children in the congested districts of cities.

NATURE STUDY AND SCHOOL GARDENING.

(Abstract of an illustrated address by Dick J. Crosby, of the Office of Experiment Stations, U. S. Department of Agriculture.)

Nature study and school gardening are features of the great forward movement in agricultural education, which is at present commanding the attention of leading educators all over the United States. In order that we may clearly comprehend the relation of nature study and school gardening to the other features of this forward movement let us examine for a moment the following outline.

FEATURES OF THE FORWARD MOVEMENT IN AGRICULTURAL EDUCATION.

I. Recognition of the need of graduate instruction in agriculture.
   (1) Graduate School of Agriculture.
   (2) Graduate courses in agricultural colleges:
      Forty colleges provide courses for Master's degrees.
      Eleven colleges provide courses for Doctor's degrees.

II. Improvements in the pedagogics of collegiate courses in agriculture.
   (1) Development of a science of agriculture.
   (2) Division of agriculture into specialties:
      Plant production—Agronomy, horticulture, forestry.
      Animal husbandry.
      Agrotechny—Dairying, sugar making, etc.
      Rural engineering.
      Rural economics.
   (3) The organization of agricultural faculties on the basis of the division of agricultural science. That is, the employment of professors and instructors of agronomy, animal husbandry,

etc., rather than a professor to teach the whole subject of agriculture.

(4) The devising and assembling of special apparatus and illustrative material to aid in the teaching of agriculture.

(5) The preparation of text-books and works of reference adapted to the needs of different grades of students.

III. Recognition of the need of instruction in agriculture below the college grade.

(1) The organizing in agricultural colleges of high school agricultural courses, one-year and two-year practical agricultural courses, short winter courses, and summer schools for teachers.

(2) The organization of college extension work in agriculture.
- (a) Farmers' Institutes.
- (c) Correspondence courses in agriculture.
- (b) Reading courses for farmers.
- (d) Experimental unions.
- (e) Nature study and school garden work with children.

(3) The organization of separate agricultural schools of secondary and grammar school grades.
- (a) State—Alabama, California.
- (b) County—Wisconsin.
- (c) Corporate—Doylestown, Winona, Mount Hermon, etc.

(4) The development of elementary instruction in agriculture in the common schools.
- (a) Elyria, Ohio.
- (b) Alabama.
- (c) Georgia.
- (d) Illinois.
- (e) Missouri.
- (f) North Carolina.
- (g) Wisconsin.

(5) The development of nature study work and school gardening in public schools of both city and country.

The first graduate school of agriculture was held at Columbus, Ohio, in the summer of 1902, but graduate courses in agriculture leading to Masters' degrees are now offered in at least forty agricultural colleges, and courses leading to the degree Doctor of Philosophy in eleven of these colleges. There is also, as a result of the investigations of the experiment stations, an accumulation of knowledge regarding agricultural subjects, which is being wrought into pedagogical form and is now quite generally recognized as the science of agriculture. This science is being divided into specialties, such as plant production including agronomy, horticulture, and forestry; animal husbandry; agrotechny, including dairying, sugar making, etc.; rural engineering, and rural economics. The faculties of our agricultural colleges are being organized on the basis of these divisions of agricultural science, so that many of the leading agricultural institutions now have agricultural faculties comparable to the faculties of medicine, law, etc., in the larger universities. Special apparatus is being devised and illustrative material prepared to aid in the teaching of agriculture, and much attention is being given to the preparation of text-books and works of reference on the dif-

ferent branches of agricultural science. A graduate of this college, Liberty H. Bailey, has recently published a comprehensive Cyclopedia of Horticulture in five volumes, and he is now preparing a Cyclopedia of Agriculture.

Along with this progress in the development of collegiate and graduate courses in agriculture has come an urgent demand for instruction in agriculture lower in grade than the college course. To meet this demand, agricultural high schools have been organized in connection with the agricultural colleges, in Maine, Minnesota, Nebraska, Oklahoma, Rhode Island, and Washington; one-year and two-year practical agricultural courses and short winter courses for busy farmers have been organized in over 70 per cent. of our agricultural colleges; and summer school gardening for the training of teachers in elementary agriculture, nature study, and school gardening are maintained in at least eight of these institutions. Another feature of the agricultural college work, not contemplated when these institutions were organized, is the extension work in agriculture, including farmers' institutes, reading courses and correspondence courses in agriculture, the organization of experimental unions and co-operative experiments, and the development of nature study and school garden work with children, including the publication of nature study and school garden leaflets, the direction of school garden work in normal school and high schools, the distribution of seeds and the preparation of plans for this work.

But the agricultural colleges have not been able fully to meet the demand for secondary and elementary instruction in agriculture, consequently separate agricultural high schools have been organized—State schools in Alabama and California, county schools in Wisconsin, and private institutions at Doylestown, Pennsylvania; Winona, Indiana; Mount Hermon, Massachusetts; Woodbine, New Jersey, and elsewhere. Furthermore, a good beginning has been made in the development of elementary instruction in agriculture in the common schools. One of our recent M. A. C. graduates is teaching agriculture and chemistry in the high school at Elyria, Ohio. In Wisconsin, public school teachers are required to pass an examination in agriculture. In Illinois and Missouri, elementary agriculture has been included in the prescribed courses of study for common schools, and in Alabama, Georgia, North Carolina, and possibly other southern states, recent legislative enactments make elementary agriculture one of the required subjects in the rural schools.

And, finally, the development of nature study work and school gardening in the public schools of both city and country is progressing under the influence not only of ten or twelve agricultural colleges, but also of fifteen or twenty normal schools, the United States Department of Agriculture, and state departments of public instruction all over the United States. In this way preparation is being made for putting school garden instruction on a pedagogical basis.

Now, what do we mean by school gardens? A school garden may be defined as a garden that performs some educational function in the school with which it is connected. It is a garden laboratory—a nature study laboratory. Nature study work, as ordinarily conducted, is passive. School gardening is active. It gives the child something to do, and "education by doing" is gaining recognition wherever really progressive educators are in charge.

Our first idea of the school garden was obtained from Germany, and the first school garden established in the United States was in connection with the George Putnam Grammar School in Boston, where, for ten or twelve years, the work consisted mainly in the observation of native plants grown in the school yard. This work was deservedly popular and led to the establishment of similar gardens in connection with a few other schools in the vicinity of Boston. In 1900 a new plan was adopted. A vacant lot, in the rear of the school grounds, was secured, and eighty-four vegetable gardens were planted by as many pupils from the seventh grade. Each pupil was given to understand that the garden cared for by him was his property, and that the products of his labor were to be disposed of as he saw fit. The advantages of this system were at once apparent, and it was not long before other schools took up the work.

The Boston Normal School established vegetable gardens in connection with its practice school two years ago, and last year normal school graduates had charge of school garden work in seven of the schools in Boston and one in Brookline. Vegetable gardens are now maintained in connection with the normal schools in Framingham and Hyannis, Massachusetts; Johnson, Vermont; Hampton, Virginia; Washington, D. C.; and several others places. At Hyannis the garden work is closely correlated with the other school work. In laying out their garden plats, the children solve, in a practical way, problems in geometry and arithmetic. They raise vegetables, sell them, open an account with the local bank by depositing their money, purchase pictures for the decoration of their schoolrooms and close their bank accounts by checking out their money. These are only a few of the exercises which they are required to perform in connection with the garden work, and it is needless to say that they enter into the work with much more zest and enthusiasm because of the very evident practical trend of the exercises. Children enjoy doing what would otherwise be drudgery when they can see that it aids them to accomplish a desired end.

The school children of Hartford, Connecticut, have the privilege of attending the Handicraft School of Horticulture just outside of the city, where a laboratory, greenhouse and nearly 200 gardens are maintained under private benefaction for their benefit. In the heart of New York City, 150 children of the street have redeemed a portion of a park reservation which, for several years, served as a public dump. Here, under the direction of competent teachers, they have spent two delightful summers in raising vegetables and learning how to cook them, and have sent many specimens to the city schools to be examined by the less fortunate children. At Hampton, Virginia, all the pupils in the Whittier School (a practice school in connection with the Hampton Normal and Agricultural Institute) from the kindergartners up, are required to do outdoor work and take instruction in agriculture. The kindergartners have beds four by six feet, those in the first grade larger beds, and last-year pupils work with horses and farm implements, in a field.

The school gardens in Washington, D. C., are conducted under the auspices of the Washington Normal School and the U. S. Department of Agriculture, the latter furnishing a small greenhouse, potting room, seeds and plants, land for thirty gardens, and volunteers to oversee garden work in other parts of the city. The work is directed by the science

teacher in the Normal School, and serves as a training school in gardening for the normal students. It is regarded by Secretary Wilson, Dr. Galloway, and other competent experts in the Department as an almost unqualified success.

In all this work some attention should be given also to the subject of school ground improvement, which has been successfully introduced as a feature of school work in Rochester, Cleveland, Washington, and a

SCHOOL GARDEN, WASHINGTON, D. C.

number of other cities. Children have planted lawns, set out and cared for trees and shrubbery, and otherwise made the school surroundings more beautiful and wholesome. Schoolhouses and school grounds should be as attractive, at least, as the homes from which the children come.

School gardens in connection with rural schools, are somewhat difficult to maintain, owing to the scattered population and to the fact that these schools are closed during so great a portion of the growing season, but some instruction in the elements of plant growth might be given, and children be encouraged to grow plants of their own at home. They will gladly do this if given an interest in the crops they grow. In Illinois, Iowa and Ohio, experimental clubs have been organized among the school children, the members of which co-operate with the agricultural colleges in those states in growing two or three varieties of pure-bred corn or sugar beets. They also hold regular meetings, have institutes corresponding closely to farmers' institutes, and in Illinois they have regular lecture courses, including among the speakers such eminent professors as Dean Henry, of Wisconsin; Dean Davenport, of Illinois, and P. G. Holden, of Iowa.

Another difficulty in the rural school work, and indeed in all this nature study and garden work, is the lack of qualified teachers. But the teachers will prepare themselves for this work if they are convinced

that preparation is necessary in order to maintain their positions. There is an excellent opportunity just now for this college and such organizations as are represented here—the farmers' clubs, the dairy organizations, the livestock organizations, the granges—to promote this movement by insisting upon the introduction of agriculture into the course of study in the ten teachers' training schools provided for by the last session of the legislature. But some of you say, "Why prepare teachers

DECORATED SCHOOL GROUNDS.

for such work? We cannot teach agriculture in the common schools." The same thing was said forty years ago—yes, twenty, fifteen years ago—of agriculture in the colleges, but now everybody admits that the teaching of agriculture in the colleges is a success. There is a better chance for the successful teaching of agriculture in the common school to-day then there was in the colleges twenty years ago—a better corps of available teachers, better text-books and a less skeptical rural population. If the farmers of this country believe in their vocation and have sufficient faith in their colleges to cooperate in the organization of an active propaganda for the introduction of agriculture into the public schools, there is no reason why we may not hope to see, within a very few years, sufficient agricultural instruction in the common schools and the rural high schools to prepare the great mass of our rural population for a better understanding of agricultural literature and a more intelligent practice of farming.

FARMERS' INSTITUTES IN THE UNITED STATES.

BY JOHN HAMILTON, FARMERS' INSTITUTE SPECIALIST, U. S. DEPARTMENT OF AGRICULTURE.

Mr. President, Ladies and Gentlemen:—The farmers' institutes of the United States have come into existence within twenty years, and in that brief period have assumed proportions that entitle them to be classed among the great educational movements of modern times. The reports show that during the year, which closed on June 30, 1903, almost 1,000,000 of farming people have attended the institute meetings; that over 3,100 of these meetings were held during that year, composed of 9,570 sessions. Institutes were held in all of the states excepting three, and in all of the territories excepting Alaska, Porto Rico, and Indian Territory. The state directors, who have the management of institute work in the several states, had in their employ 924 lecturers. In addition to this force of teachers, there were the local lecturers and essayists engaged by the local managers of institutes in the several counties numbering between 3,000 and 4,000 persons.

A remarkable feature in this work is that while the several states have acted independently of each other in organizing their institutes, causing great diversity in practice in the details of the work, there is nevertheless a general agreement in the essential features, which are to carry agricultural instruction out to country people at their homes and to do this by means of the living lecturer, who is usually a man who has worked out some problem in agricultural practice in his own experience. The institute has no prescribed course of study to be pursued; it has no text-books to be consulted; no examinations to be passed for admittance or for graduation; there are no matriculation charges and no withdrawal from home to distant central school for a term of years as is required by the other educational institutions of the country. The institute system is a branch of education by itself. Its method of instruction is oral, accompanied by question and answer as the subjects are presented. It illustrates and enforces its teaching by actual demonstration, sometimes before the audience in the institute meeting, often in the field, the stable, the orchard, the nursery, or the garden. It has been organized to occupy a place and perform a service in aid of agriculture that is not occupied or performed by any other educational institution. It undertakes to educate men and women along the lines of their several specialties by supplying them with the best scientific and practical instruction along those lines, presented by the most competent teachers that the country contains. It is not a system of mental discipline organized for the development of the thinking powers, but rather a school in which men of experience are assembled for the discussion of methods of practice and of economic problems connected with the profession of agriculture.

The teaching force in the employ of the state directors is made up of men and women thoroughly equipped for the service that they have to perform. An examination into the personal history of 623 of the lecturers in the employ of the state directors shows that 287 bear college

degrees, 138 have had partial college courses, 108 have had normal or high school training, and 90 were educated in the common schools. In each instance the lecturer has had, in addition to his academic training, practical experience in some branch of agriculture, and is, therefore, competent to speak from both the scientific and practical side of the questions that he presents.

Until the institute came, the ordinary farmer had no school of instruction to which he could go for information respecting his calling. In most instances he had no knowledge of what was doing for the benefit of agriculture. He had no means of coming in contact with scientific men, and was unable to keep informed with regard to the scientific publications that were being issued by the experiment stations of the country and by the National Department of Agriculture. The farmers' institute has come as a distributing agent of scientific literature, and is taking the latest and most reliable discoveries of the experiment station and of the Agricultural Department at Washington, and is calling the attention of the farming community to their value and adaptability to their needs. The mass of agricultural literature that has accumulated within recent years is very great. Sixty experiment stations, officered by over 700 men and women, are constantly engaged in research and experiment work in the interest of agriculture, and the National Department of Agriculture has a force of 4,200 persons who are devoting their entire time to the securing of information that will be of service to the farming people of this country.

The work of the stations is published in bulletin form, and distributed free of cost to our citizens, and last year the National Department of Agriculture published over 900 different publications, composed of 45,000 pages, equivalent to forty-five volumes of agricultural literature of a thousand pages each. There were printed and distributed 11,600,000 copies of these publications.

Unfortunately the majority of agricultural people are not reached by the printed page. Many have lost the reading habit. A large number have never acquired it, and unless some messenger brings the teachings of agricultural science to these people and delivers it by word of mouth, they are likely to remain ignorant of what is being done in their behalf. The institute, therefore, has a specific work, and a well defined field of operation. As yet this work is only partially performed, and the field has only been partially covered. Much more remains for the institute to do. We have about 27,000,000 of farming people in the United States. We have reached, according to our statistics, about 1,000,000 of this number, and this twenty-seventh part has been aided to a very limited degree. The amount of instruction that each individual should receive ought to be greatly increased, and the number of those who are to receive this information is twenty-six times greater than the institutes at present organized, have been able to furnish.

Two important questions now confront the Institute Directors of the United States. The first is—How shall the number of institutes be multiplied, and their efficiency be increased? And the second is—How shall a greater degree of stability and permanency in the work be secured? The first problem resolves itself into a question of securing an additional number of competent instructors who will be able to give more of their time to institute work than has been possible by the institute force as it is at present organized. If the institutes are to reach the entire num-

ber of agricultural people, some means must be devised for greatly enlarging the institute force of teachers. In order to secure this increased number of efficient men and women, some system of normal training will undoubtedly be required.

The other question, that of making permanent, as a part of our educational system, the institute organization, is one of very great importance. In most of the states the institutes have lacked this essential feature of perpetuity. The work is largely dependent, from year to year, upon the efforts of comparatively few persons who assume the duties of organizing local meetings as the exigencies of the several districts seem to require. No college could be run by any such temporary and spasmodic method. The teaching force of the college is permanent. The organization continues from year to year, and boards of control become educated in their work, so that, as the years go by, improvements are introduced and enlargement is secured. The courses of study are perfected and the means of instruction are made more efficient. Our public schools could not exist if there were not some permanent organization, or boards of control, charged with the specific duty of looking after the interests of these schools in all of the localities in the several states. Similar methods will undoubtedly have to be adopted before the farmers' institutes will have the degree of permanency and efficiency that their work demands, and it would seem to be an important duty on the part of those who have this work in charge to consider how this organization may best be effected, and a degree of uniformity be secured among the states in institute work similar to that which now exists among the other educational institutes.

IDEAL METHODS OF ADVERTISING.

BY N. I. MOORE, MOSCOW, SECRETARY HILLSDALE CO. FARMERS' INSTITUTE SOCIETY.

I do not know as I can give an ideal method of advertising, but I can give you one which, I believe, will bring success.

It is a recognized fact today, that in enterprises that need advertising and have merit in them, the one that is advertised the most thoroughly, is the one that will be the most successful.

My experience in advertising and in institute work leads me to believe that when an institute has a small attendance, it is, as a rule the fact, that a great many people in the locality do not know of the meeting. Often, in my experience, have I met people near where an institute was in progress, that did not know of such a meeting. If it pays to do a thing, it pays to do it well, and after our State has apportioned large sums of money for the education of the farmer at the institute, those having in charge the arrangements for the meetings and programs in the several counties and townships, should utilize every means possible to let every one know of the coming institute.

When I go to conduct an institute and find no printed programs, and learn of people nearby who do not know of such meeting, I cannot help but think that there is something radically wrong somewhere.

My plan has been to get programs arranged early enough to give plenty of time for advertising thoroughly. Send programs to every paper in the county, and to adjoining counties when the meeting place is near the boundary lines. Nearly, if not all editors are glad to print programs in their papers as news. Ask them to call attention to the coming institute in each edition for two or three weeks prior to the meeting. In this way nearly all will know of the meeting. With this, and the liberal use of large posters put in conspicuous places, the circulating of the programs at the stores, granges, farmers' club meetings, etc., and by sending by rural carriers programs to leave in every mail box, and by addressing some to remote parts of the county, the institute will be thoroughly advertised. Don't forget to talk about the coming meeting, in short, keep it constantly and continually before the public.

Upon each one-day institute program I have printed the places and dates of all the one-day meetings, also the place and dates of holding the two-day institute, and the place and date of the State Round-up. By this method, on each program we are advertising all of the institutes. I have observed in many counties the officers are having a hard time raising the required amount of money by membership fee to defray the expense necessary to have printed programs and other things required for a successful institute. In many county we are raising much more money at a ten cent membership fee than we did when we collected twenty-five cents annually.

I have been at institutes in some of the best counties in the State, having a large attendance, and with a strong appeal by the secretary for members to the institute society, he would succeed in getting one member and sometimes not any. By inquiry I learned it had been that way for years, oftentimes the officers having to make up for deficiency. I believe it is far better to get twenty-five persons interested by their having something invested in an enterprise at ten cents each, thereby raising $2.50, than by getting ten persons at twenty-five cents each and raising the same amount. We have followed this theory for several years in Hillsdale county and have to make no especial effort now to raise all the money we need and more than enough, as we now have about $35.00 in our treasury, after paying all expenses for our six one-day and our two-day meetings.

I believe there is scarcely a locality in Michigan where a successful institute with a good attendance cannot be held if the proper attention is given to the advertising of the same. One of the sad features of institute work is the fact that oftentimes the very ones that should attend a farmers' institute and those who need the instruction most, are not present.

There can be much done for the work by letting this class of people know about the institute and by urging them to attend. Let us, as institute officers, adopt a better method of advertising, if possible, and thereby raise the standard of attendance and interest in these farmers' schools of instruction to a higher and a broader plane of usefulness.

CORN IMPROVEMENT.

BY PROFESSOR J. A. JEFFERY.

Farmers are coming to appreciate the need of crop improvement, both in quality and in yield.

In a general way we have known something of both the theory and the practice of crop improvement, especially of the improvement of the crop of corn. Within the past few years new life has been given to the work, and as a result we have the Corn Breeders' Association, which in turn has become a cause leading to greater activity and better thought.

While the individual worked alone, the work of improvement in most cases was slow, partly because of lack of knowledge, partly because of lack of definite intelligent purpose, and partly because of lack of proper data for the establishment of correct ideals toward which to work. The corn growers' organization is providing all of these.

A correct ideal is a very important thing. The ideal or type ear must be not merely a thing of beauty to please the eye with its color, form and symmetry, but it must be a lawful product of nature and must conform to certain arbitrarily established mathematical requirements. For example, a few weeks since a gentlemen visited the College, who, on seeing specimens of corn, declared that he had been growing, for a number of years, a corn, the ears of which surpassed anything we had in our museum. Later, at our request, he sent us some sample ears. While they proved to be fairly good ears, they were deficient in many ways, the deficiencies being most noticeable when compared with our types.

It seems to be the belief now that the ideal or type ear should be set so high as to be scarcely attained, but as it is approached it must be moved on, so still to be kept just beyond attainment.

In the corn states, the ear with its grain is the thing for which the ideal is established. I imagine that with us we must establish a standard for stalk as well as for ear. All states can harly have the same ideal or type. Varying conditions of soil and climate necessitate modifications. Michigan cannot expect to grow so large ears as Illinois.

As now established, the type ear must possess the following qualities: 1. Shape—cylindrical, tapering, or some definite combination of these two qualities arbitrarily established. 2. Color. 3. Length. 4. Circumference—measured one-third the distance from butt to tip. The length and circumference will vary with the race, or variety. For example, in Illinois the type length of Ried's Yellow Dent is 10 inches and its circumference 7 inches. For the Boone County White, length 10 inches and circumference 7.5 inches, while for the Silver Mine, length 9 inches and circumference 7 inches. 5. Rows running the complete length of ear—not crowding out or breaking up. 6. The rows must be in pairs. 7. Tip ideally covered. 8. Butts properly filled. 9. Proper shape or kernel, both as to definite shape and uniformity of shape. 10. Spaces must be slight between rows and between kernels at the cob. 11. Percentage of shelled corn to ear. In the corn belt this will range from 86 per cent. to 90 per cent., depending on the race. 12. Market conditions.

Mr. C. A. Shamel, of the Orange Judd Farmer, suggests that a type ear for Michigan for our dent corns should have a length of 9 inches, a circumference of 9 inches, and should shell out 84 per cent. corn.

In corn judging, a sample of corn—usually a ten-ear sample—is compared with the type. Each of the above characteristics are studied, and if the ten ears are perfect in all of the above points, and are also uniform in type and as compared with each other, the samples should score 100 points, but, if there are deficiencies, a certain number of points, or parts of points, are marked off. For example, if the ears were Michigan grown and we accept the standard suggested by Mr. Shamel, the ten ears should be each nine inches long, and if just nine inches long, should be credited with ten points. If they were not exactly nine inches long, then the total number of inches of excess and deficiency of length should be determined and one point thrown off for every such inch of deficiency and excess.

If the ten ears, on being shelled, weighed out 84 per cent. corn they would receive fifteen points, but for every per cent. less than 84, one point would be thrown off, so that if the per cent. of corn were 75, instead of 84, the deficiency would be 9 per cent. and therefore nine points must be thrown off and the sample would score only six points instead of fifteen, and so on.

It is thus seen that in this work the corn grower has something mathematically definite to work to in the matter of type, but after this much is accomplished, methods of culture must be studied and naturally such a line must be taken up. Further, much progress is being made in changing the chemical characteristics of corn. In some cases the protein content is being increased; in some the per cent. of oil is increased. One breeder of corn is developing high protein in one variety and high oil in another. The methods for this work must also be taken up by the association.

For years we have been giving careful attention, or at least it has been possible to give careful attention, to the improving of our live stock, and great things have been accomplished in that direction. We have not appreciated that the laws underlying stock improvement are just as fundamental and almost as easily operated in the improvement of our field crops. In other states corn growers are organizing for this purpose. In some respects the corn crop is perhaps more important to Michigan than to other states. The time seems ripe for such an onward movement on our part.

WOMEN'S CONGRESS.

Wednesday Afternoon.

The first section of the women's congress, with Miss Maude Gilchrist as conductor, met in the lecture room of the Women's Building. As Mrs. Carrie Ives Saunders, of Saginaw, who was to act as chairman of the session, was not present, Miss Jennie Buell, of Ann Arbor, was selected to occupy the chair. In addition to music and recitations, the following papers were presented:

PHYSICAL TRAINING FOR GIRLS.

BY MISS SARAH A. B. AVERY, DIRECTOR OF WOMEN'S GYMNASIUM, AGRICULTURAL COLLEGE, MICHIGAN.

"Life without health is a burden, with health it is joy and gladness." Through the body only is the mind able to express itself—how important then that we bring this medium of soul expression up to the highest point of efficiency possible. To make the body thoroughly responsive to the will, demands good health and careful training. The body is the servant of the mind only as it serves, and its measure of service depends upon the intelligent guidance and direction of the will, while mental endowment shows itself in physical expression. Our modern educational system rests on the recognition of this interdependence of body, mind and soul. The ancient Greeks embodied in their religion the cultivation of physical beauty and strength, and taught that whoever educated the mind and morals without training the body, is a cripple, and their girls and women took part in the games and sports.

For centuries physical skill, endurance and daring have counted much in the advancement of peoples and nations for, generally speaking, the "race is to the swift and the battle to the strong." Through the ages, human interest in varying degrees has concerned itself with the physical welfare, but in all this time it has been "the body for the body's sake," and men, more than women, were active in seeking physical benefits, and only comparatively recently has the subject been considered from its true standpoint and given its real place as a part of the general plan for the training of individual men and women. "Education," it has been said, "has to do with the *entire* man in whom mind and body are inseparably consolidated one with the other."

We must look at the matter of physical training from a broader point of view than the mere cultivation of muscular strength, for trained physical life is the basis of efficient brain service; a strong body under discipline is said to add 50 per cent. to mental strength. Surely in this day of rush and hurry and crushing competition the need of both a

strong body and a steady brain cannot be too much insisted upon. Rational physical training aims to increase vitality and endurance, not solely for these qualities, but that they may reinforce mental vigor. That educational institutions recognize the fact that the ability to do the best mental work rests on the foundation of sound physical health, we know from the establishment of military drill and athletics in connection with such institutions, and the employment of specially prepared teachers to take such work in charge, until now practically every school and college has facilities for training the body as well as the mind.

Dr. Krone says: "There is nothing so important, so significant, so vital, in the whole scheme of education as the development of the proper self-control, self-direction, and co-ordination of muscular activity." If we educate the child properly physically, so that he gains absolute control of the muscular system, we secure for him a well-ordered and well-balanced brain life, and develop a capacity for self-control and self-direction which means a development of the will, bringing out judgment, physical courage and skill. The three agents of good physical health are food, air and exercise; these are necessary not only for health and strength, but for life itself. It seems to me that, "Every women, whether she be an educator in the home or school, should know the value of physical work." Many of the physical faults found in older persons might have been overcome in their childhood had the parents or teachers recognized the faulty habit and realized that it might develop into an actual deformity if not checked.

Physical training should be adapted to each period of growth. Thus for the first period, from the fifth to the ninth years, the exercises should promote growth. Play in the open air is excellent, and exercises that strain the muscles or consume matter needed in growth, such as excessive rope jumping, should be forbidden. Second, from the ninth to the fourteenth years, a period of even more rapid growth and in addition to exercises that favor growth there should be others to improve the carriage, such as dancing and military drill. Care should be taken not to permit overwork, as this will stunt the body. The third period, from the fourteenth to the twentieth years, is one of the greatest development, and great care should be taken in slecting the exercises. Give work to make the heart and lungs strongly active, as these organs practically complete their development during this period. A girl or boy who has weak lungs at eighteen or twenty years will probably always be so afflicted. Encourage quickness and skill, but give no "heavy work." In the fourth period, from the twentieth to the thirtieth year, the exercises should promote general strength and endurance. This is the time of the greatest possibilities in skill and quickness. We should not seek to build up a great bulk of muscles at the expense of the vital organs. In the human form "the symmetrical is the beautiful," we should bear in mind that undirected activity is not training and does not lead to symmetrical development. To secure harmony of development is more important than symmetry of development. Students of all ages find a full schedule before them and must, in many cases, have the time planned for them and physical work made compulsory in order to get it done. This is especially true of girls, whose inclination for physical activity seems to decline with the advent of long skirts. Girls should have the same early training as boys, they forget

too soon how to play. The time is well spent when we break the routine of severe mental application by active, well chosen, *joyful* exercise. Those exercises, as a rule, do the most good that give the most cheer. Gymnastics taken even as an *additional* branch of work requiring time and some thought are recreation and relief from the weariness and languor following study. This condition being mostly a matter of the nerves can be relieved by the change from brain work to muscular work, carrying the blood from the congested nervous centers to the active muscles. The plan of exercise as a whole should be such as to build up the body evenly, to gain muscular flexibility, increase lung capacity, improve digestion, reduce nervous strain and to secure restful sleep. Exercises demanding excessive expenditure of muscular force for continued periods are always harmful as putting too great strain on the heart and lung cells. "Grace"—strength without grace but not the reverse. Good or bad condition of an individual depends upon the heart and lungs, and the exercises are planned to benefit these organs.

The importance of correct breathing should not be overlooked. To do this best, one must sit and stand and walk well, and poise and balance exercises are useful. Occasionally we find a girl who carries herself correctly without being taught. Exercise must have an object. To look well is a good thing, to be well is better.

There may be a question in your minds whether farmers' girls need any special forms of exercise. At first thought, conditions of farm life seem to meet the requirements for good health, plenty of food, oceans of fresh air and an abundance of indoor and outdoor exercise, yet the same diseases attack them. Exercise in the form of work does not afford the same degree of benefit as systematic physical culture. Housework and all manual labor tends to pull the shoulders forward and cramp the chest.

I have been speaking generally so far, but you are interested in Michigan girls, and may like to hear what opportunities are offered here for such training as we have been advocating. We have a well-equipped gymnasium in the Women's Building and, on entering College in the fall, each girl is given a physical examination, in which her personal history (health), measurements, strength tests, lung capacity, etc., are taken and recorded, and this examination is repeated the following spring, comparisons with average measurements being made at both times; suggestions for special examinations are based on this examination. Class work is obligatory three times a week, the aim of which is to promote the general health of the individual, to correct physical faults, improve the carriage and increase the lung capacity. Marching, simple and combined movements, free gymnastics, Swedish and breathing exercises with musical accompaniment later, comprise the first year's work. In the sophomore, junior and senior years, more advanced work with light apparatus is given—basket ball, tennis, and walking are encouraged. No one is excused from this work except for physical disability and then only on a physician's written recommendation.

Although the "movement cure" and "medical gymnastics" are often used with good results, gymnastics are not a "cure all" and, moreover, we here have to do with the normally healthy.

In acquainting you with the work done in the women's gymnasium, it may be well to state briefly the typical defects as we find them in our students,—their possible causes and the means taken to correct them.

The leading difficulties are, unbalanced muscular development, imperfect co-ordination (awkwardness), poor carriage, round shoulders, spinal curvature and flat chest. Most of these are due to habits formed early in life and come from imitation rather than from heredity.

Finally, physical training (1) stimulates growth, (2) makes growth symmetrical, (3) develops skill and quickness, (4) helps organs to do their best work, (5) develops poise of body and mind, (6) helps to best mental work. "What does it profit a woman to be able to translate Greek and Latin if in the days of her motherhood her body is too weak to hold her own baby at arm's lengths, crowing and plunging in the air." That, after all is said and done, is the true object of physical training for girls.

HOUSES AND HOMES, I.

BY MRS. F. D. SAUNDERS, ROCKFORD.

Among statistical reports for 1900 we find the number of farms in Michigan to be 203,261, and infer that there is an equivalent number of farm houses, as each farm is supposed to be supplied with farm building, chief among which is the farm house.

Applying the apparent characteristic trait of the American people we seek to determine the value of the house in conveniences and comforts and, too, the value of the house in building character. But it is the farm house as we find it in a majority of instances that we will first consider. Go with me in mind to view these. We yet find the old-fashioned house with a step up from the kitchen to the main living room. It requires an extra effort to take this step and multiplying this step by the number of times it is taken in a day and again in a year, it means much towards wearing one out physically. Then, too, the lack of a drain in the kitchen or upon the back porch necessitates hundreds of steps in a day in going up and down the back steps to empty pails and pans of water. The drain in a kitchen would save all these and, added to this saving of physical strength, would leave a much more clean and healthful back yard, which, without the drain, must during the winter and early spring months, become offensive.

But the matter of taking away the waste water is not the only step-saving convenience needed in the kitchen, by all means have the water supply in the house; the hard water tank is a great improvement over the drive well in the kitchen, and it has been demonstrated that with only windmill power a complete water system—including bath-tub, chair and lavatory—with hot and cold water pipes can be had in the ordinary farm house as well as in the city house.

The lack of ventilation in the farm house is noticed. Windows in all rooms should be arranged so that they may be opened from both top and bottom. The main living room, which often serves a double purpose, should be treated to a fresh air bath every morning. We preach and practice giving the sleeping rooms proper ventilation, but the odor of buckwheat cakes is often left in the living room until the vegetables cooking for dinner announce a change. Windows should not only pro-

vide means of ventilation, but should be allowed to serve their legitimate purpose, that of letting in the sunlight. Houseplants are desirable in the home, but to see every window filled to its utmost capacity with plants leads us to remonstrate against this practice. Let the cheery living-room windows be free and open for the enjoyment of the family.

Regarding houseplants, better have a few well-kept plants arranged so as not to be in the way than a promiscuous quantity occupying every pleasant window view.

The time comes in the life of nearly all farm women to see the new house built or the old one remodeled; then is when we, as farm women, should be thoroughly informed upon the best arrangement of the house toward the end of saving steps and lessening labor and at the same time make the house attractive and pleasant. Women should look up and study out all conveniences tending to help them in this housework and have the right to direct the arrangement of the house when it is being built. We believe the majority of men on the farm will be willing to concede this right if, after it is done, the wife is not finding fault about the house not being built to suit her.

There is so much more that might be said upon the farm house, but our time is limited, and as there is another phase to our subject—the home—we will briefly consider it. If all houses were homes as well, we would not need to make a distinction, but unfortunately it is not so. There are houses that possess all of the modern appliances, and externally have the appearance of homes that on entering reveal none, or but few of the home characteristics. They are but places where the inmates go in to eat and sleep, leaving the door with a sense of relief. These houses of which we speak are not essentially those of wealth as the dollars and cents value does not make the distinction between the house and the home. The home is a secret organization. It has its signs, password and salutations, but unlike other secret organizations, its password never changes. From the time that two join hands and hearts in the building of a home until the last good-by is said, the one password is *love*. The love that suffereth long and is kind.

Confidence must exist in a home. The mother should have the confidence of her children, for where confidence exists, love is stronger and the home is more united. We cannot specially emphasize the many reasons for confidence between husband and wife, or mother and daughter, but will speak of the great need of confidence between mother and son. The mother has the confidence of her son when a little child; why should added years divorce this trust? The boy from twelve to twenty is in greater need of mother's counsel, knowledge and confidence than at any other period of his life. He is most likely too bashful and timid to ask the questions that are day by day coming up in his mind. He wants to know of the mystery of life, of the development of his own creative powers, and he should be told the facts in clean, pure language; he should be furnished books to read that will give this knowledge. We, as mothers, must remember that ignorance is not innocence, and if we would keep our boys free from the vices that demoralize their character, we must give them the right knowledge at the opportune time. We must keep in close touch with the boy, share our secrets with him and give opportunity for him to talk things over alone with mother. We believe the girl in the home today is given more attention and better opportunities than is the boy.

Our homes are the units of which our nation is composed; the standard of these homes foretells what the standard of the nation will be. It is here that our nation receives its first lesson in law, order, system and obedience. The education which truly educates is the home education. We had better neglect all else rather than the home.

HOUSES AND HOMES, II.

BY MRS. EMMA A. CAMPBELL, YPSILANTI.

To illustrate my thought as to the true relation of houses and homes, I have here two views of a farm home in Ionia county. While I am speaking of the home you may look at the picture of the house. Notice the porch draped with roses and clematis; the conservatory for flowers, at the right; the fine grove of native trees backed by evergreens; the walks; the carefully graded lawn; the plats of flowers; the fountain. Anywhere that water is needed, either in fruit, flower or vegetable garden, it can be obtained by turning a faucet; while the stock of all kinds are as well supplied. This shows what can be accomplished by working constantly toward an ideal. Forty-five years ago the owner of this home—a poor man—began its development or evolution, and so without any advantage other than the poorest may have, he carved out a resting place for the heart close to nature, where he could "listen to stars and birds, babes and sages, with open heart," and trusting in him, who said, "Consider the lilies, how they grow," he passes life's afternoon.

I will not say that the rudest slab or log-house may not be a true home but it cannot remain so after one is able to provide himself a better one.

Birds build nests that they may cradle there their young, and so the building of the home presupposes the nurture and care of children. One woman, when asked the condition of a happy home, said, "six sons, six daughters and a melon patch." Now these are certainly promising factors, still the rude huts in the Tennessee mountains, though full of boys and girls and flanked by a melon patch, lack many of the attributes of an ideal home. Where is our progress if we go to living in huts! On the other extreme, we must avoid luxury, must practice "plain living and high thinking," must simplify our physical wants for the sake of intellectual gratification. No one will know, twenty years from now, the position your children occupy, whether in their childhood and youth, they slept between ironed sheets or not. No one will know whether they had tucked, ruffled, or embroidered garments or even fur-trimmed coats, but all who meet them will know by their speech, their manner, their taste, whether their mother was a cultured, educated woman or not. Let us live with our children. If they must be silly, let us be silly with them. Every boy and every girl must go through a period of "storm and stress," they need parental sympathy and encouragement; laugh at their confidences once and you will never have the chance to do so again. Dignity is an essential virtue, but we do not want too much of it in our relations with our children and their friends. Your children will need young company; see that this want is met by inviting to your home young people

of high ideals; make a point to entertain as many really excellent people as possible, if for no other reason than for the reflex influence on your own family. It makes some work, yet, not so much, as the time is past when people of refinement load down the table for company. The plainest fare will refresh if seasoned with good cheer, while the best dinner ever cooked will not nourish if the woman who sits behind the tea urn scowls and scolds. "Better a dinner of herbs where love is than a stalled ox and hatred therewith."

Let us house our homes as comfortably and artistically as possible, but above all, preserve the spirit of love and unity, remembering that our homes are the safeguard of our nation.

"WHAT WOULD YOU DO, IF?"

BY MRS. BELLE M. PERRY OF CHARLOTTE.

(Abstract.)

The subject was divided into two parts, "the supreme emergencies in which to know how to do the right thing at the right time may save a life, and the less strenuous occasions which affect in a more or less trying way the everyday life and which are, after all, the great tests of character."

Two rules of action were quoted which apply to both kinds of emergencies: "Keep cool" and "Think." The following are a few paragraphs from the paper:

"This is, of course, much easier said than done. To be suddenly awakened by a cry of fire, to find the baby has fallen into a pail of scalding water, or taken poison, calls for a new interpretation of self-control. But the awful sense of present danger makes a supreme call and people never know that life and death are in the balance. And to keep cool enables one to think.

"Suppose a child has fallen into boiling water. What would you do? The best thing possible is within easy reach, and that is to dash cold water over the burning surface. This will prevent further burning and relieve pain.

"Then the clothing must be removed. And here is something to remember. Remove it in such a way that there will be the least possible danger of tearing off or injuring the burned skin. If need be, cut the clothing off in inch pieces, rather than sacrifice a bit of the precious skin-covering of the burned surface. This tearing off of the clothing and often the skin at the same time has caused many a death. And, after the clothing is off, immerse the burned part in cool water until the suffering period is over; then dress with an application of equal parts of lime water and linseed oil. Never put flour on a burn. There is much danger of injury to the skin in removing it later."

Various simple and effective home remedies were given for the most common emergencies.

"Some day these practical things, which all boys and girls ought to

know in order to equip them for the needs and emergencies of life, will be taught and demonstrated in the public schools.

"The great emergencies come rarely; the lesser ones come often and especially do they come to the housekeeper. But every-day trials are to people what the elements in nature, in their rougher moods, are to vegetation. They give strength and fibre. The things that hurt are often the things that help. If a thing can be helped, figure out a way to help it. If it cannot, bear it philosophically.

"The habit of looking on the bright side of things helps out in the every-day emergency. Often it is our attitude of mind that makes a thing a blessing or a burden. For instance, most people think money and leisure two of the most desirable things in the world. They are the best things and the worst things. Give a young person his time and plenty of money, and if he amounts to anything it will be because he has enough surplus of good native strength to rise above the temptations to selfish idleness.

"Give a child everything it wants and it will appreciate nothing. It must learn value by doing things, earning things. Also, to be employed in congenial work is to be happy. If one is not happy in his work something is out of joint. Maybe he is not doing his work well. William Morris expressed an eternal truth in the words, 'Life without industry is guilt; industry without beauty is brutality.'

"Mrs. Garfield was obliged to be her own housemaid in her early married days. She was philosophical and reasoned, 'If I must make my own bread I am going to make beautiful bread.' And she succeeded not only in making beautiful bread, but in being very happy in doing it. Work was thus lifted out of drudgery into an art simply by the attitude of mind of the one who did it.

"So we see that work brings appreciation of the results of work, and that it brings happiness. It brings a train of other things that contribute to joy. The wealthy idler has money to buy the most elaborate banquet. But all the money in the world cannot buy an appetite. Work alone will do that. To be able to enjoy a crust may be the greatest luxury.

"Emerson says, 'When you do not know what to do, wait.' Many a perplexing problem will somehow clear itself over night. 'If we listen lowly we can always hear the right word,' says the same philosopher. The rest and quiet of the night shut out the clamor of distracting things and a quiet comes over the spirit which enables one to listen and catch the word which will solve the problem.

"I know very well that occasions often come in the life of a housekeeper when she is so 'worked out' that things wear and vex that would be passed by without friction if her spirits were in tune. The thing to do next is to get into tune. Maybe a quiet hour all alone will be the remedy. If so, I would have it though the heaven's fall, so to speak. When this dangerous state is on, it should have as prompt treatment as a fainting fit. Eliminate the unnecessary.

"With the spirit in tune and a practical philosophy of life, joined to good common sense, each soul may work out its own growing solution of the always-to-be-met-with, 'What would you do, if?' gathering from the experience of others and giving of its own, each a little light in the world and all uniting to make up the great sum of human activity and endeavor in the processes by which God moulds man."

At the close of Mrs. Perry's able paper on "What to Do, If," there seemed little left to say on the subject, and as the time limit had been reached, Miss Lyford dismissed the discussion with a few words relating to the two necessary requirements in case of an emergency—to keep cool and think—both of which seem unexpectedly possible when it is another for whom we must think. She suggested the presence in every home of an emergency box, which can be used at any time, containing:

Old linen, flannel or muslin,
Lint,
Sticking plaster,
Linseed oil,
Lime water,
Scissors,
Pins,
Tape,
Measuring glass and cup,
Feeding cup or straw,
Small drinking glass,

And after telling of the cool-headedness of a young German count, who, while, the shipwrecked vessel was rolling on the reef, threatening every moment to break in two, or slide off to sink in deep water, and the crew were busy getting out the life boats, popped into the pantry, scooted around in search of eggs, turned on the steam and cooked fifty, which he triumphantly distributed among the half-clad passengers as they took their places in the boats,—the speaker remarked that this sort of courage was the kind most needed in our daily lives. Then she begged to close the program with this simple and suggestive receipt, "For a Day"—

"Take a little bit of water cold
And a little dash of prayer,
And a little bit of the morning gold
Dissolved in the liquid air.
Add to your meal some merriment
And a thought for kith and kin,
Then as a prime ingredient
And plenty of work thrown in.
Spice it all with the essence of love
And a little whiff of play,
Let a wise old book and a glance above,
Conclude the well-made day."

Thursday Afternoon.

Mrs. F. D. Saunders, of Rockford, acted as chairman of the second session of the women's section. Papers were presented by Mrs. C. M. Partch of Armada and Miss Jennie Buell of Ann Arbor and Mrs. Mae M. Gingles, Agricultural College. At the close of the session the ladies were invited to the parlor, where a musical treat was furnished by the teachers and pupils of the department of music, under the direction of Miss Louise Freyhofer, instructor.

SCIENTIFIC HOUSEKEEPING.

BY MRS. C. M. PARTCH, ARMADA.

It is to the eternal credit of woman that through all these ages she has, for the most part, endeavored to fill the sphere assigned to her to the best of her ability, oftentimes but dimly realizing the importance of her work and so falling short of its highest possibilities, yet always bringing to it the maximum of loving self-sacrifice. But she wakes up to find that the Twentieth Century is demanding more of her than did the early years in the history of the race, and she realizes that if she is to meet this demand her knowledge of housewifery must keep pace with the increasing activities of the husbands and sons who are being fitted by her for fighting life's battles and winning its victories. She realizes, that if she is to be held responsible for the health of her household, she must understand what causes disease and what makes for health; that if the lack of good morals is to a considerable degree caused by the lack of a properly nourished body, then so much the more must she know how to provide the proper nourishment for those under her care; in other words, she sees she can no longer be excused on the plea of ignorance, but is expected to be a scientific housewife.

Increasing wealth has brought to us the ability to build our houses so well that the cold air finds almost no way of getting in. We can heat them to summer temperature and can live in a hothouse atmosphere that robs us of our vitality, weakens our powers of resistance and leaves us easy prey to the germs of pneumonia and tuberculosis; we can load our tables each day with the sweetmeats and pastries which our hardy ancestors deemed luxuries, but which to us seem necessities and the too frequent use of which leaves us no appetite for the plainer and more nourishing food we ought to eat.

Increasing ambition for wealth has led us into the false economy of buying where we can buy the cheapest, and this same ambition has tempted manufacturers into giving us, not the thing we ask for, but some adulterated product. These adulterations are more often than not injurious, and are found in the most unsuspected places, till even with the best intentions, we scarcely know what we are eating; we can afford to ride instead of walk, and so are losing the power to take that bracing and exhilirating form of exercise; we are trying to crowd the work of years into days, until the pace we have set for ourselves is not so far behind that of the woman who said to her companion at a formal dinner, "Be quick and tell me how the world was made while the plates are being changed." In these and in many other ways we have departed from the quieter and saner methods of living and "How to meet these changed conditions," becomes the problem of the house and homekeepers of today.

Before we set about improving ourselves as housewives, we must first be convinced that there is need for improvement and that we are neither doing our work in the best nor yet the easiest way, for scientific housekeeping is first of all easy housekeeping and "the woman who wears herself to shreds and tatters keeping house, has the case proven against her

at once." Now when a man undertakes cooking or any branch of housework, he makes it—a "Business;" he realizes the dignity and importance of his work and his own as well; as a cook he calls himself a chef, and charges accordingly. On the other hand, women look upon a knowledge of housewifery as their birthright; they expect it to come by inheritance or intuition. They think any woman knows enough to keep house, and the idea that they need any special training, such as they would need in any other branch of work, seems to them absurd. When we realize the dignity and importance of our work we shall understand the necessity of special training for it.

The scientific housekeeper knows well that mere soap and water cleanliness is not enough, that a daily or weekly stirring up of the dust in her rooms is not enough. She knows that she and her family must have clean air to breathe, and she will see to it that sleeping or waking, summer or winter, they are supplied with fresh, vitalized air, air upon which the sun has had a chance to exercise its life-giving influence. She will see to it that there are no dark, damp corners in her house and that the sunshine is allowed to enter everywhere. She knows that danger lurks in poorly constructed drains and in cesspools, and she sees to it that drains are properly constructed and that garbage and other waste products are disposed of in a sanitary method; all this means that she must have at least a fair knowledge of housebuilding, ventilation and sanitation.

The scientific housekeeper understands the machinery of the human body and the value of different kinds of food for supplying the fuel for keeping the machinery in good running order. She knows that children and old people are not equally benefited by the same kind of food; in fact, that which is beneficial to one is harmful to the other; she knows that those of her family who are following sedentary occupations do not need and cannot assimilate the hearty, abundant food that she ought to furnish for the active workers. She knows that the perfectly nourished and otherwise well-kept members of her family can brave the fiercest storms and snap their fingers in the face of pneumonia, consumption and contagious diseases, and she believes it is far less trouble and much cheaper to prevent disease than to cure it. This requires some knowledge of physiology and the chemistry of foods.

The scientific housekeeper knows that her ability to provide the comforts and luxuries of life, and to meet her social and philanthropic obligations, depends very largely upon her ability to manage carefully and wisely the family income. She is neither unwisely extravagant nor foolishly parsimonious, but makes every dollar buy its full equivalent. This necessitates some knowledge of business methods.

The scientific housekeeper believes in system, but will not let it tyrannize her; has a sense of proportion, and is thus able to distinguish between essentials and non-essentials; she practices simplicity in cooking, in housefurnishing and in dress both for hygienic reasons and to cut off all unnecessary work. Understanding herself and her work thoroughly, she is able to wisely direct the work of her assistants, and is not likely to be heard bemoaning the difficulties of the servant question. It would be difficult to attach a money-value to the services of the homemaker who is thoroughly in love with her family and her work, but she can count among her sure rewards the satisfaction of knowing that she

is "master of the situation," equal to any emergency, and that in her own peculiar province she can by no means "be found wanting," and best of all, that her husband and her children will rise up and call her "blessed."

WANTED TODAY—MORE HOMEMAKERS.

BY MRS. CARRIE IVES SAUNDERS, SAGINAW.

Domestic Science and Home Making means a knowledge of something more than just cooking, cleaning and sewing. It means, among other things, that the fathers and mothers should realize that they are the "builders of the home of the souls of their children." Think carefully of all that this last sentence means and that it should be the desire of the majority to produce and show to the world the best specimens of manhood and womanhood possible.

Fathers and mothers are appointed by God as stewards to care for their children that He has endowed with life, and they will be accountable to Him for that stewardship. More children go wrong through lack of sympathy, confidence and appreciation from parents, than from any other cause. A child should early be taught to obey through love because papa and mamma know best, never threatened with punishment, or continually scolded. Parents should so live as to court the fullest confidence of their children and then never betray that confidence.

Furnish the home with plenty of good wholesome reading matter, discuss with the members of the family "current events," the news of the day, looking up on some map the location of places where these things happen. Give the children something to think about, and do with their hands. Teach them to be self-helpful, change about and read aloud. Give them books containing "History and Mystery of Common Things." Tell them the why and wherefore of things instead of putting them off with, "Don't ask so many questions," "Go out of doors and play," or, perhaps, send them unattended into a remote part of the house where they may get into unforgetable mischief. Teach your children early in life that they are your helpers, that you could not possibly get along without their assistance. God help the children that are so frequently reminded that they are a burden, that it costs so much to educate and clothe them, and that they are not worth bringing up. Such talk strikes a blow every time that drives them farther and farther away from your heart and home and in time of old age and second childhood, when the parents perhaps have met with reverses, the children whose hearts were starved in their infancy, will starve and neglect the heart and comfort of the father and mother who bore them.

Children certainly should be taught early in life the value of money by letting each one purchase and keep account of the supplies for the family. Take them with you to market, into dry-goods stores, show them the difference between good and unreliable goods, give them a voice in selecting material for their own wearing apparel, then, when thrown upon their own resources, they will make fewer mistakes. The boys as well as the girls should be taught to help mother with her work. It is

a credit to any young man who knows how to cook plain food, put it upon the table in an attractive manner, tidy up a room, wash the dishes and sweep and dust; all these with a cheerful heart will make him a better husband for some young lady.

If a mother in her unselfishness neglects to teach her daughters to do all these things, thinking that after she has had a good time doing nothing until she is married, it will come easy enough and be time enough to work; if she neglects to do these things she is cheating most terribly the young men who may marry her daughters, and will receive no thanks in the end from the girls, who, when too late, realize their deficiency. The world needs more girls who have had a practical training in all matters pertaining to a home and fewer who have a knowledge of stenography, typewriting, factory-work, or selling goods behind the counter. Many young men refuse to marry girls that they may admire very much for other qualities, because they have not been trained to use the good common sense and gumption necessary for doing plain, practical cooking, and to mend neatly before learning to embroider. Then again girls should be given every opportunity to know how the young men they contemplate marrying treat their own mothers and sisters; whether they have been trained to realize what it means to be a breadwinner and provide the necessary things for a home. And the young man should frequently visit the home of the girl he intends to ask to be his wife and know how she keeps her room, if she mends her own clothes, if she is kind and thoughtful to the members of her own family; unless she is, she will not make a good wife, no matter how sweetly she may smile while company or strangers are around. A young lady who demands better clothes than the mother wears, or the young man who must have his apparel better than the father's, will not make the best men and women.

Parents should keep young for the children's sake and attend to their personal appearance that the children may never feel ashamed of them, but only too proud to introduce them to their friends as "My Father," "My Mother," and as each word is uttered let there be an abundance of love in it. Fathers should be the best beaux of their girls and to the boys the "best jolly fellow" they know. Mothers, the sons' best girl and the sweetest girl they will ever know until they select one as a wife.

Children reared in homes where the parents, through kindness, command respect, will be obedient and for love of them will do nothing to bring the blush of shame to their cheek. Have the son's room just as neatly furnished as the daughter's. Many young men seek the society of saloons and other dens of vice because they find jolly company, pretty trappings, music and song that may bring death to home, happiness and soul. Homes should be places to live and be happy in, as well as places to eat and sleep—a place with plenty of sunlight. It is "God's Smile" and free, the best cure for blues, germs and microbes. Bugs, moths and all manner of evil things lurk and multiply in places when curtains are lowered and "God's Smile" seldom seen.

MAKING THE MOST OF ONE'S SELF AT HOME.

BY MISS JENNIE BUELL, ANN ARBOR.

"We all have within us continents of undiscovered character. Happy is he who plays the part of Columbus to his own soul." In this neat way has some one summarized the complex nature of a human life and at the same time suggested its undeveloped possibilities. To each individual is set the problem of making the most of his or her life, but it sometimes seems as if to the woman in the farm home life is set the most difficult and intricate of all these problems. It is the most delicate because the most vital and complicated, touching the issues of life at their very springs and in the most personal of ways. "With nations as with men," says President Roosevelt, "the most important things are of the household." And woman in the home is there supervising these "important things of the household." While the most responsible of all positions, it is also in closer intimacy with fewer people, restraints are removed and a consequent greater strain upon nerves and muscles results. She realizes that the changes in the generations of her foremothers have wrought grave changes in the attitude she is expected to bear toward the outside world. Her scope of influence may not be enlarged, but the field in which she must exercise it is certainly broadened. From being looked upon as only the physical mother of the race, she is now consulted and looked to as the social and philanthropic "other-mother" of every endeavor for better living in the home and without. Mistress of a thousand trades she needs to be, with wisdom and sympathy to fit her for a world's counselor.

Facing all the demands of her problem, and realizing its import, what then? She must resolve to build upon conditions as she finds them in her own home and within her own self. The lily cannot be blossomed in mid-air without its stem to draw sustenance from the earth. Neither can tangible results be secured in day-dreams without solid foundation to rest them upon. She must recognize her own identity and resolve that it shall be preserved. Too long was self-abnegation looked upon as the whole duty of woman. She knows now that she helps those dearer to her than life best by first helping herself to the best within her reach. If she neglects this, she may discover it in the most pitiful of experiences for a mother,—feeling her children do not expect her to be interested in their studies nor informed on the topics of the day that lie outside her own little round of work. She sees, too late perhaps, that in her love for her family she has quieted her judgment and laid down her rightful opinions in a willing but mistaken sacrifice. Besides, also, it is not difficult "for love's sweet sake" to drift into a sort of unselfishness that in reality is unsuspected mental lethargy.

Let her but once determine that her reason shall rule her affection, and power is born of the union. Obstacles fall before it, one scarce knows how. More and more system controls one's every-day routine; the unessential distinguished from the essential and little by little discarded. She fits her work-rooms and surroundings to the convenience and comfort of her body, recognizing that her body is to serve her best

by doing her work with as little tiring and time as possible. She attires it in a dress of becoming pattern and color, even for her daily tasks, and cares for it to the best of her knowledge and opportunity. She recognizes that "Culture is not a having and a holding but a growing and a becoming" and tries in all ways available to her to secure this truest of all culture. As a bit of lace in the neck of her morning dress or a muslin tie under her collar is of account in the solution of her nearest problems, she wears it. As a picture, cut from a magazine, pinned up in her kitchen and having a message for her, is of more help to her than if it were framed and hung in her guest room, she puts it where it will do the most good.

Without detracting from the faithful doing of her appointed tasks, she plans to come every day in touch with some thought of some one else in books or papers that will relax the strain on her mind and add zest to her own thinking and planning. It may not be a set reading course that she chooses to brighten her mind upon. It may, perhaps, more profitably be a following up for herself of one of the lines that she has the most to do with, as kindergarten, house sanitation, values of food and its adaptations to her family needs, the botany of her house-plants, garden vegetables and door-yard shrubs, the poultry at the barn or birds in the fields. Anything, investigated and thought upon with a live interest will work wonders. "Lack of motive is all that makes life dreary," is a line that might well be written upon our home walls when there is the temptation to call its work "drudgery," for that state of affairs exists where there is mental inertia in connection with the nearest duty set the hands to do.

Moreover, the woman who grasps the significance of her opportunities and her part in making the most of them, knows that her home influence is not bounded by her house walls, but that its life must overflow into the life of the neighborhood. Such community associations must be formed as will widen the mental and spiritual horizon of herself and family, increasing knowledge and deepening charity in them all.

The discussion was opened by Mrs. E. E. Bogue, Agricultural College, who spoke as follows:

The words of the subject which has just been so ably discussed embody three distinct ideas—a place, a personality and a power, and the problem is how this power may make the most of a personality in this place.

The place is full of meaning and possibilities to the business or professional woman who is so strenuously striving to make the most of herself in competition with man in his own field, and to the bachelor girl who has cut herself loose from the conventionalities of her parents' home and has set up a home of her own, because they need the quiet, the repose and the refinement which it may afford; but to the housewife it becomes a realm in which she rules and which loses its significance and becomes an establishment without its sovereign who imparts to it the spirit of home.

We also maintain that even as home is not complete without a woman, neither is a woman quite at her best except in a home. This place is a narrow or a broad sphere, depending upon the woman who reigns in it, not upon its wealth or other advantages. We need to cultivate higher ideals in the formation of homes and to raise the standard of housewifery amongst our girls. Educational institutions which afford

training similar to the domestic course in this college are doing much toward this end. It is not the conditions which surround us that make us what we are, but the use we make of them. Domestic service may harden the hands, but it does not harden and degrade the heart as much as business-service does.

Men may mould the affairs of a nation, but woman moulds the life of the nation, and it is in the capacity as giver, trainer and inspirer of life that woman may reach her highest development and make the most of herself. The home is the source from which issues the principles which control society and the State, and it is a natural and a divine instinct which leads a woman to prefer home to any field of action, the field in which we are today considering her activity and the effort to make the most of herself.

When are we at our best? In the increasing complexities of life and the manifold avenues which lead from the home to the outside world, we often fail to distinguish between the essential and the non-essential, moral growth and material gain, pleasure and the instruments of pleasure, the picture and the frame, the individual and his environment.

We have reached a high plane of development when we prize life more than livery; when we measure the strength of individuals by their moral fibre and when we count education, culture and material means—as valuable and as desirable as they most surely are, as secondaries.

"The highest manifestation of life is love," and love—not that based on personal preference, but that which includes all mankind—will lead us to care for things outside ourselves and will find expression in service, which is above everthing else, our divine destiny.

First find our own personality, discover ourselves by detaching all the conventions and customs which we have "pinned on" in an effort to be like someone else, then with the field of present, contiguous duty as the base of our operations, we can gradually extend our service and sympathy to those in our own home—including those paid to serve us—to our neighborhood, to our church, and farther as opportunity and ability permit.

Love which links us to the "All-loving" is the power which generates and governs the noblest and most effective expressions of life.

Having found our pivoted point, which is moral growth, and having learned to value and choose the essentials, and knowing our own capacities and limitations, we should proceed to live our own life, simply, honestly and without fear or hesitation.

Physical development must not be neglected, for health is one of our strongest allies. The mother's health is more essential to the home than party dresses for the girls, or course dinners for the guests, and she should not only take time to rest but time for regular and systematic physical exercise aside from her daily routine duty. Friends she must have, pleasure and diversion she must have, but they should be in keeping with pure, simple tastes and of a quality which will elevate herself and the home.

Mental culture should be sought, and here a concentrated purpose compatible with individual taste, should direct the choice of a field in which to dig for truth. Spend a little time every day in the pursuit of this ONE thing, and do not be tempted by the pursuits of others to abandon it.

We would sum up our argument in a few sentences. "To make the most of one's self at home"—

Elevate the home.
Be yourself.
Cultivate simplicity of living.
Choose the essentials.
Strengthen your moral fibre.
Have one purpose, to which everything else is tributary,—that of loving service—beginning with the immediate and including as much of the associate surroundings as possible.

SEWING IN THE SCHOOLS.

BY MRS. MAE M. GINGLES, AGRICULTURAL COLLEGE.

People who are fortunate enough to live in a civilized country and under self-governing laws must not forget that they owe to the succeeding generations a vast debt—one whose face should not only be paid, but paid with interest compounded. And this debt—what is it? It is the transmission of its best wisdom to the rising generation. Our success as a nation depends upon the question of education. The field is widening year after year, and we note the constant improvement in methods through the whole educational system—from the rural schools to the colleges and universities. At no point, however, can we cease our labors and say, "it is perfect." Constant improvement must be made to meet changing conditions, otherwise we cannot progress or stand still; we either advance or recede. All these efforts are not merely to prevent the growth of illiteracy but to make education practical and useful, and enable the individual to develop into a capable worker and good citizen.

It is our bounden duty to leave no stone unturned in our efforts to aid in the constant improvement of the public school system. The time is not merely coming but now is when we realize that old methods must be improved by the introduction of new ideas, or replaced entirely by those of a different order. One advanced step in the line of practical education, which intensely interests us at the present time, is the manual training feature of our schools and colleges. It is by no means new, but many there are even now who little appreciate what it does for the young mind. It developes to a greater degree than we are willing to believe, unless we have examined into the subject thoroughly and carefully observed results.

The coming generation demands men and women endowed with a broad and practical education, and it is our business to make just such an education possible to everyone who care to avail himself of it. One of the saddest things we have to face in later life is lost opportunity. If we fail to do all we can for the true education of the boy and girl of today the result to them is lost opportunity even though we are the cause. Let us look to it well that no narrow, petty or careless motives of ours handicap the young people who are soon to be developed men and women upon whom the nation will depend.

The world that was once apparently so small and demanded so little from us has rapidly developed to a remarkable degree, and is it wrong to assert that this development is only just beginning? I think not.

And what of the men and women who live in such age—what is expected of them; what must they be and what must they do to fulfill their allotted tasks under such conditions? Conditions constantly change, and we must be prepared to meet the demands. Life is a great big glorious thing, if we know how to cope with its problems and are possessed with sufficient wholesome energy. There is little room for the narrow, bigoted mind today. Such a life sums up little to its credit when the final balance is struck.

I plead for a practical education which thoroughly equips the boy and girl with the possibility of doing for himself or herself the development into a well-balanced and independent man or woman.

How can this be best brought about? I firmly believe that manual training in connection with general school work has now become a necessity in the general school system. Develop a child's hand and eye together with the power to control certain muscles; does that development stop there? No, indeed; it affects the whole general judgment and extends into every part of its little life. Then measure the progress of this work, if you can, as it extends through the grades and on into the college course. The results are wonderful. All this develops self-reliance, judgment, self-activity, adaptability and independence of thought, qualities which we are needing more and more as time passes, and the demands upon us become greater. Not infrequently, too, is one's natural ability found, and this is of no small consequence in a life.

Bring about this development by the use of common, every-day materials—the absolute necessities of every-day life—and what have you as compensation for your work:—a practical young man or young woman; one who has an altogether different opinion of so called labor. The girl can think; she can feel; she can also sew and cook, and she has, in addition, a good, wholesome opinion of the every-day duties of life. Their importance is brought home to her as they could not be under less favorable conditions. Such women will solve the servant girl problem if nothing else will. A woman of this kind will have two weapons at hand:—first, an appreciation of the maid's duties; and, secondly, the independence which enables her to perform these duties herself. We are learning to thoroughly admire the woman who can do things, who can feel, who can sympathize as well as pose.

We do not educate our girls today in order that they may merely develop into "society women." The "society woman," in the narrow sense of the term, is not the popular woman of the present time. Not that I would undertake to belittle the social side of life by any means. It is a highly important element in our lives and without it we cannot grow, but it is not the sole object of life. We want our girls to be practical ornaments in the kitchen as well as in the drawing-room. We want them to be proud of the fact that they can fit in anywhere where occasion requires. We want to make noble wifehood and motherhood possible to them—homekeepers in every sense of the term. In this hurried life of ours too little time is given to small details, so essential in developing a good homekeeper. Too often we lack neatness, order, in the value of doing little things and doing them well. There is a crying demand for the good housekeeper—something that every woman should be, whether she performs the actual manual part of it or not. If there is anything that can be introduced into our school system that will aid

in making this kind of woman possible, then we should lose no time in availing ourselves of it.

And what this kind of an education will do for a girl it will also do for the boy. He will be far better able to successfully deal with the problem of life than one who is merely confined to theoretical knowledge.

Manual training certainly has a moral effect when it teaches an appreciation of what work is and what it means in life; that all honest work is honorable if undertaken in the right spirit, and finished according to the best of one's ability. If we give our best to the world, it matters not so much what the work is, whether it is cooking a wholesome meal or writing a powerful sermon, if it is only our best. All good work counts because it helps to build the individual character of the one "who does his best." As George Herbert says—

"Who sweeps a room as for Thy laws
Makes that and the action fine."

But do I hear the argument that our school days are altogether too full now? Even as it is, we are accused of cramming and overworking the students. Yes, but you will find that the little time spent in the manual work acts as a recreation, and the student can do quite as much, if not more, work in the remaining time, and with less nervous strain. Our college course is very full, but we know that the young women would not accomplish more study if the hours spent in domestic work were taken from that department and given over to study hours.

Now, where can this practical work be introduced into the course of study, and how. In my judgment, sewing can be introduced into the fourth or fifth grades, and cooking lessons a little later, the domestic work then continuing through the grades. As the girls come to us from the tenth and twelfth grades, the necessity for the simpler kinds of work in the grades is continually made manifest to us. Many of them have no idea of the use of the needle, and many more with only an incorrect knowledge, which is even more difficult to overcome than to teach the girl who knows nothing whatever of sewing. Think what the possibilities would be if all this preliminary work had been carefully gone over in the grades. And mind you, I say carefully. I think the bad results from incompetent instructing in manual education is quite as far reaching as poor teaching in any other line of education can possibly be. Instructors in manual work need just as careful preparation as the ones who teach English, history or the sciences. I do not say that as long a time is required for this preparation, but it must be quite as carefully and conscientiously done. Just anyone who can sew or cook cannot necessarily teach others to sew and cook. Such an instructor, to be successful, must possess all the instincts of the natural teacher; she must hold and enthuse her class; she must be able to give out the best that is in her, and present her subject in an attractive manner, otherwise she should never attempt to instruct others. May I say that the real teacher must possess two qualities:—first, the inherent ability to teach in the best sense of the term; and, secondly, the broad and comprehensive education. Without the first quality no one should ever presume to face a class with the intention of instructing. How much of the lack of interest, the desultory way in which pupils

often do their work, etc., is due to the teacher, think you? It is the duty of school boards and superintendents to see that none are employed as teachers unless they are teachers in every sense of the word. Those who are not actuated by merely mercenary motives, social position, or anything else other than fulfilling their proper duties in the world. Am I digressing from my allotted subject? I think not; without the one you cannot make the other possible.

When I speak of manual training in the grades, I do not mean to limit it to graded schools located in cities and towns. I see no reason why a certain amount of manual work cannot be taught in the rural schools. Teachers in the district school could, in a very short time, prepare themselves to teach all the sewing that would be necessary to give to girls as far as the completion of the eighth grade. Cooking lessons, and work for the little boys, would be quite easily learned, but not as easily put into the rural schools, due to the necessary appliances, etc. We are all interested in the much-talked of plan at the present time—the centralization of the district schools, and when this is brought about, the introduction of the manual work will be a comparatively easy thing. I sincerely hope the time will soon come when all students may have the opportunity of just this sort of an education—whether they are located in the country districts, or in the towns. The school education of many of them will stop with the completion of the course in the home school, and they should not be entirely deprived of this instruction along manual lines.

(Following these general remarks, a portfolio was exhibited, showing the preliminary sample work done at M. A. C. in sewing, fully illustrating what part of this work is well adapted to use in graded schools, and also in the rural schools. This should be followed in the intermediate schools by simple garment making, and this by the more complex pattern drafting, cutting, fitting and making of garments as the work reaches the high school.)

DEMONSTRATION LECTURES.

In order that the visitors might become familiar with the work of the College, arrangements were made by a number of the departments for special lectures on Wednesday, Thursday and Friday mornings at 9:30 o'clock. They included judging dairy cows, by Prof. Shaw; practical butter and cheese making and milk testing, by Prof. Michels; grafting, budding and pruning, by Prof. Hedrick; judging beef animals, by Prof. Shaw; judging horses for soundness, Dr. Waterman; spraying and spraying apparatus, by Prof. U. P. Hedrick; corn breeding, Prof. Jeffery. The laboratories and class rooms were open for inspection at the same hours, and many of the visitors spent considerable time in the shops of the mechanical department inspecting the work of the students. The library, greenhouse and museum also had many visitors.

Although no special arrangements had been made in the women's department, the class rooms and laboratories were open for visitors, and many of the lady visitors spent their mornings watching the work of the women students in the laboratory, kitchen and sewing rooms. They were also greatly interested in the work of the girls in the gymnasium and in the wood shop.

The following outlines give an idea of what was done in several of the departments.

DAIRY CATTLE DEMONSTRATION.

BY PROFESSOR SHAW.

Specimens of four breeds of dairy animals were used for demonstration purposes in the class room. Dairy form was discussed and illustrated from two standpoints. First, from the standpoint of the dairyman who handles grade cows and requires a simple and practical method of estimating profitable producers where records have been kept and a tester is not available, i. e., a cow for purchase in another man's field. In such cases no written standards are available like unto those established by the various breed associations, hence the dairyman is frequently at a loss for a standard to apply in such cases. On the other hand, however, in dealing with pure bred animals, the standards established by the various breeders' associations must be complied with. A number of these were illustrated. In addition some time was spent comparing the various types and discussing the merits and faults of the animals presented. Score cards were distributed and the method of judging employed by students was described.

BEEF CATTLE DEMONSTRATION.

BY PROFESSOR SHAW.

Representatives of four breeds were presented for illustration. Ideal form of beef type was discussed briefly, after which the animals were criticised from both breed type and beef type standpoint. Attention was especially directed to that form and finish which would produce the greatest percentage of valuable thick-fleshed cuts devoid of excessive fatness. The market is beginning to discriminate against tallowy beef and the producer must heed the demand or become the loser. To produce a good quality of beef the breeding animals, particularly the bull, must be possessed of a wealth of natural flesh; steers require to be fed on balanced rations and must be brought to the block at an early age. Unfortunately, excess of fat is more easily and cheaply produced than thick flesh.

Carcasses of beef and cuts, also, were shown in the meat house, illustrating the remarks relating to quality in meat production, as were also swine and mutton carcasses.

COOKING LABORATORY.

During the days of the Round-up many visitors enjoyed watching the classes at work in the Cooking laboratory in the Women's Building. The freshman classes were learning to prepare meat croquettes, and these were served with tomato sauce. The principles of frying were being mastered; the students were demonstrating an attractive way of using up "left overs;" the rules for the preparation were learned in the thick white sauce used for binding the croquettes and the well-seasoned tomato sauce which was to be served with the croquettes both as a garnish and a relish. Skill in manipulation was shown in the forming of the croquettes.

The advanced class in cookery were busy in preparing a variety of attractive and delicious dishes, namely waffles, queen fritters, timbales, fondant cakes, angel food cake, puff pudding with foam sauce, lemon pie, tomato jelly, salad with cream dressing and cranberry sherbet.

DOMESTIC ART.

The demonstration work done in the class-room of the Domestic Art Department, under Mrs. Mae M. Gingles and Miss Helen E. St. John, instructors in sewing, included the following:

Sophomore Work.

Wednesday morning,—lesson in sampler work.

Thursday morning,—pattern drafting and garment cutting.

Friday morning,—sewing on undergarments.

Junior Work.

Tuesday and Thursday afternoon,—fine needlework.

Wednesday afternoon,—lesson in light carpentry in woodwork room, demonstrating how women can successfuly use the saw, plane, chisel, etc.

REPORT OF THE COMMITTEE ON RESOLUTIONS.

To the Chairman and members of the State Farmers' Round-up at the Agricultural College, February 23-26.

Your committee do most heartily endorse the work done by Prof. L. R. Taft as Superintendent of Institutes.

We would recommend the erection of a stock judging pavilion on the College grounds.

We favor the passage of a law looking to the proper branding of all so-called "stock foods" with an analysis of its contents on every package.

We favor the further extension of the one-day institute plan.

We also favor the elimination of the present restriction in regard to the legislative appropriation for the Agricultural College in the so-called one-tenth mill bill.

We desire to acknowledge our indebtedness to the newspapers of the State, especially to the Detroit Tribune, for reporting our meetings, also to the faculty and students of the College for their courtesy and kindness, and to the railroads for reduced rates to the institute.

Whereas, The evident trend of public sentiment along educational lines is towards those subjects which can be made practical in increased efficiency in the ordinary avocations of life, as well as those studies which result in intellectual strength and development, and

Whereas, These subjects in addition to being practicable in the ordinary affairs of the farm also possess the other advantages of developing and strengthening the mental capacities of the student "equally with any of the subjects now being taught in primary schools of Michigan," and

Whereas, None of these subjects are now being taught in these primary schools; therefore,

Resolved, That we, as representatives of the agricultural classes of the State, do hereby urge that provision be made whereby the elementary principles of the various scientific branches involved in the common operations of the farm be included in the curriculum of our common rural schools.

Resolved, That we favor the establishing by the National Government of a parcels post system.

Resolved, That we favor national, State and local co-operation in

bringing about an improvement of the public wagon roads—and the changing of our constitution to permit it.

Resolved, That we urge our senators and representatives in congress to favor the Adams bill now before them, increasing the appropriation made to the Agricultural Experiment Stations of the various states.

Respectfully submitted,

C. S. BARTLETT,
WM. ROSE,
CHARLES B. WELCH,
Committee.

OFFICERS OF COUNTY INSTITUTE SOCIETIES, 1904–5.

County.	President.	Address.	Secretary.	Address.
Alcona	Robert Walker	Harrisville, r. d. 1.	L. A. Colwell	Harrisville.
Allegan	Chas. W. Button	Hopkins	C. B. Welch	Douglas.
Alpena	S. M. Fox	Long Rapids	W. A. Hall	Long Rapids.
Antrim	E. M. Olds	Bellaire	T. N. Chapin	Bellaire.
Arenac	Peter Gilbert	Sterling	M. E. Osborne	Standish.
Baraga	L. J. Gallagher	Baraga	H. Lundin	Baraga.
Barry	J. F. Edmonds	Hastings	Ross Burton	Hastings.
Bay	F. W. Dunham	W. Bay City, r. d. 1	Wm. McKay	Kawkawlin.
Benzie	H. T Phelps	Beulah	R. B. Reynolds	Bendon.
Berrien	F. C. Franz	Niles	R. W. Reese	Eau Claire.
Branch	A. L. Smith	Girard	Isaac Corless	Coldwater.
Calhoun	C. J Miller	Battle Creek, r. d. 1	Wm. Powell	Marshall.
Cass	G. H. Redfield	Edwardsburg, r. d. 1	Clarence F. Wells	Cassopolis.
Charlevoix	E. B. Ward	Charlevoix	R. W. Paddock	Charlevoix.
Cheboygan	C. F. Smith	Cheboygan	G. D. Richards	Wolverine.
Chippewa	Thos. Morrison	Pickford	Frank H. Taylor	Pickford.
Clare	L. H. Thompson	Clare, r. d. 2	Fred Hudson	Clare, r. d. 1.
Clinton	E. E. Warren	Ovid	Daniel Lewis	Ovid.
Crawford	O. Palmer	Grayling	Jno. A. Love	Roscommon.
Eaton	J. H. Gallery	Eaton Rapids	Geo. A. Perry	Charlotte.
Emmet	Freeman Jackson	Harbor Springs	Mrs. Mary Holland	Good Heart.
Genesee	H. L. Freeman	Flushing	H. W. Phillips	Davison.
Gladwin	E N. Fairchild	Dale	H. R Clarke	Gladwin.
Gd. Traverse	R. H. McMullen	Traverse City	E O. Ladd	Old Mission.
Gratiot	W. T. Pitt	Elwell	Geo. Lake	Ithaca.
Hillsdale	E. T. Parker	Hillsdale	N. I. Moore	Moscow.
Houghton	J. H Jasberg	Hancock	Ira E. Randall	Houghton.
Huron	Philip Keppler	Verona Mills	Jas Haley	Bad Axe.
Ingham	Chas. W. Clarke	Dansville	B. J. Austin	Mason.
Ionia	A. M. Willett	Ionia	Fergus Flanagan	Ionia.
Iosco	John Sullivan	East Tawas	H. L. Drake	Tawas City.
Isabella	Chas. M. Brooks	Mt. Pleasant	M. E. Kane	Mt. Pleasant.
Iron	J. L. Kinney	Iron River	A. W. Quirt	Iron River.
Jackson	Clarence Reed	Spring Arbor	Henry Dart	Concord.
Kalamazoo	Milo A. Snow	Richland	Fred S. Nichols	Kalamazoo, r. d. 9.
Kalkaska	F. A. Dowling	Barker Creek	D. P. Rosenberg	Kalkaska.
Kent	Geo. E. Rowe	Gd. Rapids, r. d. 11.	Geo. F. Richardson	Grand Rapids, r. d. 5.
Lake	H. H. Little	Luther	Philip A. Hoover	Luther.
Lapeer	C. P. Johnson	Metamora	S. R. Bolton	Lapeer.
Leelanau	J. G. Weiss	Keswick	A. W. Mebert	Keswick.
Lenawee	E. A. Taylor	Onsted	Samuel Young	Morenci.
Livingston	M E. Dunning	Howell	Herbert M. Wells	Howell.
Macomb	Geo. A. True	Armada	A. J. Freeman	Romeo.
Manistee	M. S. Howes	Yates	Elmer Brimmer	Marilla.
Mason	G. G. Wing	Ludington	S. E. Meyers, r. d. 3.	Ludington.
Mecosta			R. A. Andrus, r. d. 4.	Lakeview.
Menominee	Ira Carley	Ingalls	Norwood Bowers	Stephenson.
Midland	Thos. Fisher	Freeland, r. d. 2	J. D. Studley, r. d. 3.	Midland.
Monroe	Chas. French	Petersburg	Thos. E. Allen	Carleton.
Montcalm	Melvin Hull	Lakeview, r. d. 1	John H. Jenson	Lakeview.
Montmorency	Alonzo Smith	Atlanta	Geo McClenathen	Atlanta.
Muskegon	Thos. F. Rogers	Ravenna, r. d. 3	Geo F. Routson	Ravenna.
Newaygo	E. C. Tinney	Fremont	Geo. W. Gehlbach	Fremont, r. d. 2.
Oakland	C. S. Bartlett	Pontiac	Chas. H. Andrews	Orchard Lake.
Oceana	Theodore Dikeman	Hart	Geo. A. Hawley	Hart.
Ogemaw	E. W. Clark	West Branch	Robt. Horsell	West Branch.
Ontonagon	A. S. Cornell	Ewen	W. B. Hatfield	Ewen.

OFFICERS OF COUNTY INSTITUTE SOCIETIES, 1904-5.—*Concluded.*

County.	President.	Address.	Secretary.	Address.
Osceola	Angus McKay	Hersey	Z. Pixley	Hersey.
Oscoda	Orrin Royce	Luzerne	Nelson Bailey	Mio
Otsego	F. J Stafford	Elmira	J. H. Fisher	Gaylord.
Ottawa	F. P. Peck	Coopersville	Henry H. Boeve	Holland, r. d. 5.
Presque Isle	Isaiah Devitt	Millersburg	Angus McDonald	Millersburg.
Saginaw	John Ure	Saginaw, W.S. r.d.8	John A. Slocum	Saginaw, W.S., r.d.8.
Sanilac	Lester Mitchell	Croswell. r. d. 3	Ira G. Purdy	Croswell
Schoolcraft	J. J. Riley	Manistique	Fred Greenwood	Manistique.
Shiawassee	C. B. Cook	Owosso	Mark D Grout	Morrice.
St. Clair	Daniel Foley	Emmett	Wm. Mason	Avoca. r. d. 1.
St. Joseph	Orville Dougherty	Three Rivers	P. P. Major	Three Rivers.
Tuscola	N. E. York	Millington	J. E. Lewis	Vassar.
Van Buren	F. E. Warner	South Haven	Geo. L. Rich	Paw Paw.
Washtenaw	J. K. Campbell	Ypsilanti. r. d. 4	Miss Julia Ball	Hamburg.
Wayne	Randolph Graden	Hand Station	James W. Brighton	Wyandotte.
Wexford	T. H. Callis	Manton	Wm. Rose	Manton.

COUNTY INSTITUTES WITH DATES AND ATTENDANCE.

County.	Date.	Place.	Attendance.							Total.	Average per session.	Largest plus ½ next largest.
			1st day.			2nd day.						
			A. M.	P. M	Eve.	A. M	P. M.	Eve.	W.S.			
Alcona	Jan. 13-14	Harrisville	25	73	.....	25	75	150	60	408	82	217
Allegan	Feb. 16-17	Fennville	.....	40	.....	62	157	.....	35	294	98	223
Alpena	Nov. 3-4	Wilson	.....	17	107	20	34	.....	.....	178	44	124
Antrim	Jan. 27-28	Milton Center	40	100	100	80	110	150	.....	580	116	205
Arenac	Jan. 20-21	Standish	24	40	60	45	35	.....	.....	204	40	82
Baraga	Nov. 9-10	Baraga	13	28	130	14	16	19	.....	220	44	147
Barry	Feb. 12-13	Hastings	69	119	450	145	375	.....	103	1,261	252	703
Bay	Jan. 22 23	Auburn	20	58	225	24	38	.....	41	406	81	264
Benzie	Jan. 8-9	Inland	28	83	80	60	96	.....	40	387	77	177
Berrien	Feb. 18-19	Niles	125	200	225	250	400	500	120	1,820	303	770
Branch	Feb. 8-9	Coldwater	102	276	201	201	178	520	291	1,769	295	843
Calhoun	Feb. 16-17	Marshall	85	154	105	90	189	182	.....	805	134	280
Cass	Feb. 12-13	Cassopolis	50	180	160	150	110	.....	250	900	180	450
Charlevoix	Dec. 17-18	Boyne City	26	105	76	61	91	.....	25	384	77	168
Cheboygan	Dec. 15-16	Cheboygan	10	22	10	24	36	.....	24	126	25	72
Chippewa	Nov. 10-11	Pickford	6	21	129	23	21	.....	25	225	45	152
Clare	Dec. 15-16	Clare	21	30	200	32	50	.....	40	373	74	245
Clinton	Jan. 13 14	Ovid	50	160	350	100	150	.....	112	922	184	481
Crawford	Dec. 1-2	Grayling	10	16	16	16	19	.....	16	93	18	43
Eaton	Feb. 17-18	Charlotte	75	150	100	105	160	.....	75	665	133	310
Emmet	Dec. 15-16	Petoskey	46	87	83	51	93	.....	61	421	84	197
Genesee	Jan. 18-19	Clio	60	160	200	60	200	425	130	1,235	205	590
Gladwin	Jan. 21-22	Gladwin	30	63	57	50	75	40	79	394	65	185
Gd. Traverse	Jan. 29-30	Traverse City	67	180	110	130	180	.....	80	747	149	350
Gratiot	Jan. 20-21	Ithaca	71	180	250	150	102	.....	40	793	158	340
Houghton	Nov. 11-12	Houghton	15	25	25	20	22	.....	.....	107	21	36
Hillsdale	Feb. 12-13	Hillsdale	42	99	141	116	150	.....	98	646	129	316
Huron	Jan. 18-19	Bad Axe	.....	150	175	50	76	.....	75	526	131	250
Ingham	Feb. 9 10	Dansville	90	118	200	30	95	.....	50	583	116	273
Ionia	Feb. 10-11	Ionia	110	350	175	150	550	250	.....	1,585	264	725
Iosco	Jan. 11-12	Tawas City	27	58	45	25	43	.....	9	207	41	84
Iron	Nov. 4-5	Iron River	20	52	65	25	125	.....	31	318	63	188
Isabella	Jan. 18-19	Mt. Pleasant	80	180	100	125	150	.....	160	795	159	400
Jackson	Feb. 18-19	Parma	75	200	250	100	150	.....	150	925	185	425
Kalamazoo	Jan. 20-21	Vicksburg	53	100	190	103	180	211	.....	837	139	306
Kalkaska	Dec. 3-4	So. Boardman	25	65	52	30	35	.....	.....	207	41	91
Kent	Jan. 13-14	Lowell	50	100	.....	115	125	125	206	721	144	393
Lake	Dec. 1-2	Luther	.....	35	60	25	53	.....	50	223	49	133
Lapeer	Jan. 20-21	Lapeer	88	208	145	67	224	.....	.....	732	146	328
Lenawee	Feb. 1-2	Clinton	45	185	222	80	188	.....	68	788	157	367
Leelanau	Feb. 1-2	Sutton Bay	34	125	.....	110	110	.....	.....	379	94	180
Livingston	Feb. 18-19	Howell	44	135	75	105	225	.....	125	709	141	417
Macomb	Jan. 25-26	Richmond	.....	125	300	35	76	.....	68	604	151	372
Manistee	Jan. 25-26	Brown Tp	.....	30	69	45	85	.....	.....	229	57	119
Mason	Jan. 11-12	Ludington	91	113	35	81	65	.....	78	463	92	199
Mecosta	Feb. 1-2	Sylvester	.....	40	85	52	115	.....	.....	292	73	157
Menominee	Nov. 13-14	Stephenson	9	66	106	16	17	.....	27	241	40	139
Midland	Jan. 8-9	Midland	37	78	38	56	120	.....	42	371	74	201
Monroe	Jan. 27-28	Carleton	66	210	230	150	320	.....	53	1,029	205	488
Montcalm	Jan. 15-16	Trufant	72	15	90	155	110	.....	98	540	108	285
Montmorency	Dec. 3-4	Atlanta	.....	25	47	16	42	65	22	217	43	97
Muskegon	Jan. 11-12	Ravenna	60	125	200	100	63	.....	105	653	130	284
Newaygo	Jan. 13-14	Hesperia	.....	104	94	74	78	.....	60	410	102	190
Oakland	Feb. 17-18	Pontiac	40	110	100	86	175	.....	.....	511	102	230

COUNTY INSTITUTES WITH DATES AND ATTENDANCE.—*Concluded.*

County.	Date.	Place.	Attendance.							Total.	Average per session.	Largest plus ½ next largest.
			1st day.			2nd day.						
			A. M.	P. M.	Eve.	A. M	P. M.	Eve.	W. S.			
Oceana	Jan. 8-9	Hart	16	55	110	66	63	.....	.....	310	62	143
Ogemaw	Jan. 18-19	West Branch	33	60	75	66	90	.....	40	364	72	167
Ontonagon	Nov. 6-7	Ewen	.....	27	135	11	25	158	28	384	77	225
Osceola	Dec. 17-18	Reed City	80	147	153	108	96	.....	60	644	109	232
Oscoda	Nov. 6-7	Mio	.....	26	70	68	125	110	40	439	88	220
Otsego	Dec. 17-18	Vanderbilt	8	35	150	18	38	.....	40	289	57	189
Ottawa	Jan. 6-7	Zeeland	71	182	137	93	160	.....	60	703	140	311
Presque Isle	Jan. 15-16	Millersburg	19	65	170	50	66	.....	43	413	82	224
Saginaw	Jan. 25-26	Freeland	50	240	450	125	225	.....	84	1,174	235	604
Sanilac	Jan. 20-21	Croswell	.....	175	150	.....	225	.....	120	670	223	432
Schoolcraft	Nov. 12-13	Manistique	13	20	30	.....	.....	.....	.....	63	21	40
Shiawassee	Jan. 15-16	Corunna	65	150	125	100	125	.....	45	610	102	245
St. Clair	Jan. 22-23	Capac	.....	226	246	80	315	340	.....	1,207	241	497
St. Joseph	Feb. 10-11	Three Rivers	.....	42	26	24	70	28	32	222	44	123
Tuscola	Jan. 22-23	Caro	.....	125	.....	125	275	.....	98	623	207	435
Van Buren	Feb. 17-18	Hartford	62	148	182	200	175	.....	45	812	162	320
Washtenaw	Feb. 16-17	Willis	71	169	209	137	183	.....	113	883	176	400
Wayne	Feb. 8-9	Flat Rock	62	146	184	126	124	.....	118	760	152	334
Wexford	Jan. 6-7	Manton	38	138	280	83	75	.....	98	712	142	336
Round-up	Feb. 23	M. A. C.	.....	225	250	.....	.....	.....	.....	4,960	450	1,100
	" 24	"	450	750	525	.....	.....	.....	.....			
	" 25	"	400	700	560	.....	.....	.....	.....			
	" 26	"	200	300	600	.....	.....	.....	.....			
Total										47,509	.....	21,858

ONE DAY INSTITUTES WITH DATES AND ATTENDANCE, 1903–04.

County.	State speaker.	Places.	Dates.	County secretary.	Attendance.			Total.	Average per session.	Largest plus ½ next largest.
					A. M.	P. M.	Eve.			
Allegan	J. N. Stearns	Le'sure	January 19	Edward Hutchins	.....	65	70	927	57	103
		Glenn	" 20		.....	75	49			90
	W. F. Raven	Douglas	" 22		40	40	.....			60
		Graafschap	" 28		50	95	.....			120
		Hamilton	" 29		.....	60	.....			60
	W. A. Ellis	Cheshire	February 10		25	95	50			120
		Hopkins	" 11		30	80	.....			95
		Allegan	" 12		32	80	.....			96
Alpena	N. A. Clapp	Cathro	January 18	Geo. T. Cathro	.....	8	79	87	43	83
Antrim	Chas. H. Alvord	Mancelona	December 15	S. M. Hewitt	.....	35	.....	268	38	35
		Alden	" 16		.....	.....	44			44
		Central Lake	" 17		15	35	45			63
		Atwood	" 18		45	50	.....			73
Barry	P. B. Reynolds	Delton	January 11	J. F. Edmonds	30	50	49	769	69	75
		Woodland	" 12		95	125	.....			173
		Middleville	" 13		35	90	.....			108
		Star Hall	" 14		45	135	.....			158
		Lacey	" 15		50	65	.....			90
Bay	H. B. Cannon	Garfield	February 9	Wm. McKay	26	35	45	119	29	63
		Willard	" 10		.....	13	.....			13
Berrien	Geo. E. Rowe	Eau Claire	December 14	R. W. Reese	40	150	100	1,322	120	200
		Naomi	" 15		50	102	.....			127
		Berrien Center	" 16		35	170	.....			188
		Galien	" 17		100	200	.....			250
		Galien	" 18		150	225	.....			300

Branch	W. A. Ellis	California	January 18	Isaac E. Corless	105	185	200	2,319	100	293
		Bethel	" 19		100	175	200			288
		Noble	" 20		.....	56	63			91
		Bronson	" 21		42	150	110			205
		Batavia	" 22		50	70	56			103
		Sherwood	" 23		45	98	107			156
		Butler	" 25		60	122	240			301
		Girard	" 26		45	70	60			100
Calhoun	Prof. C. D. Smith	Goguac Lake	August 18	Wm. A. Powell	225	450	.....	3,057	145	563
		Lyon Lake	" 19		300	400	.....			550
	N. P. Hull	Bedford	January 13		105	169	144			241
		Convis	" 14		75	81	.....			119
		Partello	" 15		25	63	.....			76
		Marengo	" 16		61	83	.....			114
		Emmett	" 18		75	122	.....			160
		East Leroy	" 19		109	152	.....			207
		Newton	" 20		17	34	.....			43
		Lyon Lake	" 21		88	147	.....			191
		Homer	" 22		53	79	.....			106
Cass	H. B. Cannon and C. D. Lawton	Glenwood	January 27	C. F. Wells	28	45	.....	302	50	59
		Dowagiac	" 28		24	82	.....			94
		Dowagiac	" 29		51	72	.....			98
Chippewa	N. K Potter	Rosedale	November 12	F. H. Taylor	.....	7	.....	58	19	7
		Dafter	" 13		.....	29	.....			29
		Rudyard	" 14		.....	22	.....			22
Clare	Chas. H. Alvord	Eagle township	November 17	Fred Hudson	12	20	.....	68	17	26
		Farwell	" 18		10	19	.....			24
		Winterfield	" 19		42	48	.....			69
		Harrison	" 20		.....	10	.....			10
Clinton	W. F. Raven	Elsie	December 15	Daniel Lewis	10	46	.....	479	44	51
		Dewitt	" 17		20	56	64			92
		Victor	" 18		26	42	.....			55
		Eagle	February 16		34	86	.....			103
		Maple Rapids	" 17		30	65	.....			80
Crawford	Peter Voorheis	Love	November 18	John A. Love	.....	20	.....	68	17	20
		Benedict	" 19		10	18	.....			23
		Forbush	" 20		.....	20	.....			20

ONE-DAY INSTITUTES WITH DATES AND ATTENDANCE, 1903-04.—*Continued.*

County.	State speaker.	Places.	Dates.	County secretary.	Attendance. A. M.	Attendance. P. M.	Attendance. Eve.	Total.	Average per session.	Largest plus ½ next largest.
Eaton	W. F. Raven	Chester	November 30	Geo. A. Perry	75	143	174	1,380	115	246
		Vermontville	December 1		110	312	.....			366
		Brookfield	" 2		48	98	.....			122
		Bellevue	" 3		52	104	.....			130
		Diamondale	" 4		44	86	124			187
Emmet	Chas. H. Alvord	Pellston	December 9	S. S. Shepard	50	60	75	398	56	96
		Epsilon	" 10		45	66	.....			89
		Readmond	" 11		50	52	.....			77
Genesee	E. A. Croman	Goodrich	December 9	H. W. Phillips	140	350	400	890	296	575
Gladwin	N. K. Potter	Dale	December 15	H. R. Clarke	40	73	83	528	48	120
		Grout	" 16		32	61	59			90
		Gladwin township	" 17		29	45	80			103
		Butman	" 18		9	17	.....			22
Grand Traverse	H. B. Cannon	Kingsley	December 15	E. O. Ladd	24	85	.....	214	26	97
		Mayfield township	" 16		16	22	.....			30
		Grant townsnip	" 17		15	39	.....			47
		Grawn	" 18		4	9	.....			11
Gratiot	H. B. Cannon	Breckenridge	January 6	Edward Maurer	50	90	100	465	66	145
		Forest Hill	" 7		.....	20	.....			20
		Sumner	" 8		.....	60	20			70
	Prof. C. D. Smith	Bannister	February 19		.....	125	.....			125
Hillsdale	H. B. Cannon	Litchfield	January 20	N. I. Moore	55	140	200	1,278	91	370
		Moscow	" 21		16	40	.....			48
		North Adams	" 22		12	180	.....			201
		Wheatland	" 23		100	140	.....			190
		Cambria	" 25		30	85	.....			100
		Camden	" 26		25	100	125			175

Houghton	L. M. Geismar	Chassell	December 9	Ira E. Randall	24	53		267	29	65
		Hancock	" 10		12	16				22
		Calumet	" 11			12				12
		Lake Linden	" 12		23	48				60
		Allston	" 15		31	48				64
Huron	W. A. Ellis	Pigeon	January 12	John Harrison		75		540	90	75
		Ubly	" 14			125	70			160
		Harbor Beach	" 16		50	70	150			185
Ingham	N. P. Hull	Onondaga	December 2	R. J. Robb		31		615	51	31
		Leslie	" 3			24				24
		Stockbridge	" 4		34	99	48			123
	Chas. H. Alvord	Mason	January 6		15	40				48
		Okemos	" 7			42				42
		Williamston	" 8		40	120				140
	N. P. Hull	Leslie	March 4		33	89				106
Ionia	N. A Clapp	Pewamo	January 26	F. T. Flanagan	81	157		1,532	109	198
		Palo	" 27		117	209				268
		Smyrna	" 28		55	124				152
		Lake Odessa	" 29		110	226	157			305
		Danby	" 20		61	110				141
	W. F. Raven	Hubbardston	February 18		35	65	25			83
Iosco	N. K. Potter	Alabaster	January 28	J. W. King			64	64	64	64
Isabella	N. I. Moore	Herrick	December 8	M. E. Kane	12	35		357	51	41
		Brinton	" 9			65	80			113
		Broomfield	" 11		25	40	100			120
Jackson	N. P. Hull	Leoni	January 6	H. L Foster	23	49		367	61	61
		Norvell	" 7		39	57				77
		Hanover	" 8		47	152				176
Kalamazoo	N. P. Hull	Cooper	December 16	L. H. Stoddard	90	140		552	78	185
		Oshtemo	" 17			54	52			80
		Augusta	" 18		54	82	80			122
Kent	Geo. A. True	Whitneyville	January 12	Geo. F. Richardson	28	56		262	43	70
		Kinney	" 13		14	60				67
		Grand Rapids	" 15		44	60				82

ONE-DAY INSTITUTES WITH DATES AND ATTENDANCE, 1903 04.—*Continued.*

County.	State speaker.	Places.	Dates.	County secretary.	Attendance.			Total.	Average per session.	Largest plus ½ next largest.
					A. M.	P. M.	Eve.			
Lake	N. P. Hull	Dublin	November 17	Philip A. Hoover	7	9	.....	24	24	13
		Bristol	" 18		12	20	.....			26
		Chase	" 20		25	33	67			84
Lapeer	N. P. Hull	Hadley	January 11	Fred Palmerlee	55	120	209	1,597	160	269
	Chas. H. Alvord	Almont	" 13		87	307	400			554
		Imlay City	" 14		32	195	.....			211
		North Branch	" 15		22	170	.....			181
Leelanau	H. B. Cannon	Maple City	December 9	A. W. Mebert	12	22	.....	169	21	28
		East Leland	" 10		28	35	.....			49
		Northport	" 11		14	16	.....			23
		Bingham	" 12		16	26	.....			34
Lenawee	N. I Moore	Sand Creek	January 20	Samuel Young	.....	110	45	2,608	144	133
		Ogden Center	" 21		112	236	182			327
		Riga	" 22		.....	32	.....			32
		Deerfield	" 23		40	210	250			355
		Tecumseh	" 25		.....	262	220			372
		Wolf Creek	" 27		.....	84	72			120
		North Rome	" 28		168	200	250			350
		Hudson Center	" 29		.....	80	55			108
Livingston	W. A. Ellis	Parshallville	January 15	H. M. Wells	64	85	.....	288	72	117
		Deerfield Center	" 16		41	98	.....			119
Macomb	W. A. Ellis	Romeo	January 12	A. J. Freeman	29	79	40	558	69	99
		Davis	" 13		14	106	160			183
		Chesterfield	" 14		50	80	.....			105
Manistee	R J. Crawford	Yates	December 8	Erastus V. Potter	44	51	.....	363	51	73
		Bear Lake	" 9		17	63	110			172
		Manistee Twp	" 10		15	33	.....			41

Mason	A. P. Gray	Scottville	December 15	Charles M. Houk	25	51	.....	287	36	64
		Summit	" 16		45	55	.....			78
		Custer	" 17		35	45	.....			63
		Fountain	" 18		15	16	.....			24
Mecosta	E. A. Croman	Millbrook	December 1	R. A. Andrus	9	32	.....	226	28	37
		Remus	" 2		11	30	.....			36
		Big Rapids	" 3		30	63	.....			78
		Morley	" 4		15	36	.....			44
Midland	L. W. Oviatt	Smith Crossing	December 7	J. D. Studley	14	53	95	1,307	87	122
		Laporte	" 8		30	95	235			283
		Poseyville	" 9		35	55	170			198
		Crane	" 10		55	160	175			255
		Homer Center	" 11		16	55	67			95
Monroe	Geo. A. True	Ida	December 15	Richard Vivian	.....	26	.....	111	37	26
		Maybee	" 16		25	60	.....			73
Montcalm	W. F. Raven	Greenville	January 5	Carl Weinrich	88	169	132	876	87	231
		Amble	" 6		46	78	112			151
		Stanton	" 7		80	96	.....			136
		Crystal	" 8		49	26	.....			62
Montmorency	R. J. Crawford	Lewiston	November 18	Geo. McClenathen	3	8	.....	80	11	10
		Vienna	" 19		8	18	22			31
		Hillman	" 20		8	13	.....			17
Muskegon	L. J. Post	Holton	December 16	Geo. F. Routson	48	95	.....	248	124	119
		Casnovia	" 18		25	80	.....			93
Oakland	J. A. Jeffery	Rochester	February 4	F. D. Wells	46	230	.....	276	138	253
Oceana	N. I. Moore	Cranston	December 15	W. F. Taylor	.....	40	55	391	39	75
		Benoni	" 16		.....	50	.....			50
		Ferry	" 17		12	14	70			77
		Walkerville	" 18		.....	40	50			70
		Weare	" 19		.....	25	.....			25
		Mears	" 20		.....	35	.....			35
Osceola	J. W. Cochrane	Marion	December 8	John Schmidt	20	40	.....	185	46	50
		Evart	" 9		55	70	.....			98

ONE-DAY INSTITUTES WITH DATES AND ATTENDANCE, 1903 04.—*Concluded.*

County.	State speaker.	Places.	Dates.	County secretary.	Attendance. A. M.	Attendance. P. M.	Attendance. Eve.	Total.	Average per session.	Largest plus ½ next largest.
Ottawa	M. L. Dean	Coopersville	December 9	Henry H. Bovee	78	100	.....	667	83	139
		Lamont	" 10		53	92	.....			119
		Jamestown	" 11		34	50	.....			67
		New Holland	" 12		90	170	.....			215
Presque Isle	P. B. Reynolds	Moltke	December 16	Martin Trafelet	20	25	.....	60	20	35
		Haginsville	" 18		.....	.....	15			15
Saginaw	H. B. Cannon	Frost	February 12	John Ure	45	106	.....	227	56	129
		Bridgeport	" 13		24	52	.....			64
Sanilac	P. B. Reynolds	Minden	January 2	D. H. Dawson	.....	40	.....	2,158	143	20
		Deckerville	" 4		15	107	55			135
		Shabbona	" 5		.....	40	55			75
		Elmer	" 6		22	68	175			209
		Marlette	" 7		31	275	80			315
		Brown City	" 9		125	520	450			745
St. Clair	W. F. Raven	Yale	January 12	R. Maurer	85	397	486	2,871	239	685
		St. Clair	" 13		61	168	304			388
		Memphis	" 14		73	238	475			594
		Emmett	" 15		40	260	284			414
Tuscola	H. B. Cannon	Fairgrove	January 11	W. F. Dowling	35	200	250	1,628	135	350
		Vassar	" 12		.....	25	.....			25
		Millington	" 13		80	250	.....			290
		Mayville	" 14		48	210	.....			234
		Kingston	" 15		40	90	.....			110
	Gerrit Masselink	Cass City	" 16		.....	250	150			325
Van Buren	T. A. Farrand	Bloomingdale	February 9	Frank E. Warner	85	200	225	1,804	200	325
		Lacota	" 10		172	270	210			375
		Lawrence	" 12		84	258	300			429

Washtenaw	N. P. Hull	Salem	January 26	Julia Ball	.....	75	.....	1,395	127	75
		Stony Creek	" 27		126	173	.....			233
		Chelsea	" 28		.....	117	88			161
		North Lake	" 29		.....	45	.....			45
		Webster	" 30		127	177	203			292
		Salem	March 22		87	178	.....			222
Wexford	T. A. Ramsay	Clam Lake	December 15	Wm. Rose	40	40	50	460	46	70
		Pleasant Lake	" 16		35	40	.....			58
		Meauwataka	" 17		30	50	75			100
		Carpenter	" 18		50	50	.....			75
Total								40,422	.....	30,378

INDEX.

INDEX.

	Page.
Address, Introductory, Geo. B. Horton	25
Address, President of Dairymen's Association	10
Advertising Institutes, Ideal Methods of, N. I. Moore	114
Alvord, Major Henry E., Dairying in France	38
Apple Orchard and Its Needs, The, A. P. Gray	99
Avery, Miss Sarah A. B., Physical Training for Girls	118
Bacteria in Milk, Some Actions of, Professor Chas. E. Marshall	27
Bates, E. N., Dairying in the South	13
Ballinger, Lees, Cucumber Culture, Discussion of	63
Bee Keeping and Horticulture Session, Program of	86
Beef Cattle Demonstration, Prof. R. S. Shaw	139
Bees and Fruit, Professor U. P. Hedrick	89
Bliss Dairy Medals, Award of	12
Bogue, Mrs. E. E., Discussion led by	132
Bogue, Prof. E. E., Forest Nurseries and Their Care	78
Buell, Miss Jennie, Making the Most of One's Self at Home	131
Campbell, Mrs. Emma A., Houses and Homes, Discussion of	123
Cannon, Howard B., Harvesting the Sugar Beet Crop	59
Cheese Sales, Merging of, Norman B. Horton	17
Clapp, N. A., Profitable Pork Production	71
Clark, Prof. Judson F., Care of the Farmers' Wood-lot	80
College Dairy Herd, E. A. Croman	31
Conference of Institute Workers and Delegates	9
Cook, C. B., Small Fruit for Home Use and Market, Discussion of	97
Cooking Laboratory Demonstration	139
Corn, Some Products of, Professor J. A. Jeffery	52
Corn Improvement, Professor J. A. Jeffery	116
Croman, E. A., College Dairy Herd, Discussion of	32
Crosby, Prof. D. J., Nature Study and School Gardening	106
Cucumber Culture, M. L. Dean	62
Dairy Cattle Demonstration, Prof. R. S. Shaw	138
Dairy Cows and Their Proper Care, Colon C. Lillie	18
Dairy Herd at the Agricultural College, Professor R. S. Shaw	29
Dairy Economies, Professor C. D. Smith	32
Dairying in France, Major Henry E. Alvord	38
Dairying in the South, E. N. Bates	13
Dean, M. L., Cucumber Culture	62
Demonstration Lectures	138
Domestic Art Demonstration	139
Earle, Hon. H. S., Township, State and National Co-operation in Highway Building	42
Farnsworth, W. W., Small Fruit for Home Use and Market	94
Feeding Lambs for Profit, Discussion of, Peter Voorheis	69
Feeding of Steers, The Economical, H. H. Hinds	68

	Page.
Feeding Stuffs and Their Value, Commercial, Prof. F. W. Robison	35
Forest Nurseries and Their Care, Professor E. E. Bogue	78
Forestry, Michigan's Immediate Duty in, Professor Filibert Roth	74
Forestry Session	74
Fruits, Small, For Home Use and Market, W. W. Farnsworth	94
Garfield, Hon. Chas. W., Michigan's Immediate Duty in Forestry, Discussion of	76
Gibbons, Robt., Importance of Live Stock Husbandry	66
Gingles, Mrs. Mae M., Sewing in the Schools	134
Gray, A. P., The Apple Orchard and Its Needs	99
Hamilton, Prof. John, Farmers' Institutes in the United States	112
Hamilton, Prof. John, The Ideal Highway System	46
Hand Separator Creamery System, E. J. Kneibehler	15
Hayes, N. B., Lambs for Profit	69
Hedrick, Prof. U. P., Bees and Fruit	89
Highway Building, Township, State and National Co-operation in, Hon. H. S. Earle	42
Highway System, The Ideal, Hon. John Hamilton	46
Highways and How to Improve Them, Hon. A. E. Palmer	39
Hinds, H. H., The Economical Feeding of Steers	68
Horticultural Session, Program of	99
Horton, Geo. B., Introductory Address	25
Horton, Norman B., Merging of Cheese Sales	17
Houses and Homes, Mrs. F. D. Saunders	121
Hutchinson, W. Z., Specialty Versus Mixed Bee Keeping	86
Institutes, County, with Dates and Attendance	144
Institutes, Farmers', in the United States, Prof. John Hamilton	112
Institutes, One-day, with Dates and Attendance	146
Jeffery, Prof. J. A., Corn Improvement	116
Jeffery, Prof. J. A., Some Products of Corn	52
Kneibhler, E. J., Hand Separator Creamery System	15
Lambs for Profit, N. B. Hayes	69
Lillie, Colon C., Dairy Cows and Their Proper Care	18
Live Stock Husbandry, Importance of, Robt. Gibbons	66
Live Stock Session, Program of	66
Lyford, Miss Carrie A., What would you do, if, Discussion of	126
Making the Most of One's Self at Home, Miss Jennie Buell	131
Marshall, Professor Chas. E., Some Actions of Bacteria in Milk	27
Moore, N. I., Ideal Methods of Advertising Institutes	114
Nature Study and School Gardening, Professor D. J. Crosby	106
Officers of County Institute Societies	142
Oviatt, L. W., Sugar Beets, Their Planting and Care	57
Palmer, Hon. A. E., Highways and How to Improve Them	39
Partch, Mrs. C. M., Scientific Housekeeping	127
Perry, Mrs. Belle M., What Would You Do If?	124
Physical Training for Girls, Miss Sarah A. B. Avery	118
Plums and Cherries for Profit, L. J. Post	103
Pork Production, Profitable, N. A. Clapp	71
Post, L. J., Plums and Cherries for Profit	103
Rabild, Helmer, Starters, Commercial and Home-made	13
Report of Superintendent, L. R. Taft	5
Report, Secretary and Treasurer State Dairymen's Association	11
Resolutions, Report of Committee on	140
Reynolds, P. B., The Corn Crop, Discussion of	56
Roads, Good, Program for Session	29

Page.
Robison, Prof. F. W., Commercial Feeding Stuffs and Their Value 35
Roth, Prof. Filibert, Michigan's Immediate Duty in Forestry 74
Round-up Institute, Report of 8
Rowe, Geo. E., Bees and Fruit, Discussion of 94
Rural School Session, Program of 106

Saunders, Mrs. Carrie Ives, Wanted Today—More Housekeepers 129
Saunders, Mrs. F. D., Houses and Homes 121
Scientific Housekeeping, Mrs. C. M. Partch 127
Sewing in the Schools, Mrs. Mae M. Gingles 134
Shaw, Prof. R. S., Beef Cattle Demonstration 139
Shaw, Prof. R. S., Dairy Cattle Demonstration 138
Shaw, Prof. R. S., Dairy Herd at the Agricultural College 29
Smith, Professor C. D., Dairy Economies 32
Specialty, Versus Mixed Bee Keeping, W. Z. Hutchinson 86
Starters, Commercial and Home-made, Helmer Rabild 13
State Board of Agriculture 2
State Dairymen's Meeting 10
Sugar Beet Crop, Harvesting the, Howard B. Cannon 59
Sugar Beets, Their Planting and Care, L. W. Oviatt 57

Taft, L. R., Report as Superintendent of Farmers' Institutes 5
Tyrrell, E. B., Bee Keeping as a Specialty 88

Voorheis, Peter, Feeding Lambs for Profit 69

Wanted Today—More Housekeepers, Mrs. Carrie Ives Saunders 129
Warner, Hon. Fred M., President of Dairymen's Association Address 10
What Would You Do If? Mrs. Belle M. Perry 124
Wilson, S. J., Secretary of State Dairymen's Association, Report 11
Women's Congress, Program of 118
Wood-lot, Care of the Farmers', Professor Judson F. Clark 80

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